

Clemson University



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CLEMSON UNIVERSITY



ANNUAL REPORT 1993-1994

Printed Under The Direction Of The
State Budget And Control Board

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1993/94

CLEMSON UNIVERSITY

PRESIDENT

The following report highlights the activities and achievements of Clemson University's academic and administrative divisions during the 1993-94 fiscal year.

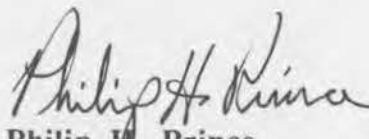
Although I was not president of the University during the period that this report covers, I was privileged to serve on its Board of Trustees and, as such, have firsthand knowledge of many of the programs and events covered in this report.

One of the major University-wide initiatives under way during this past year was the work of several task forces to restructure the University's organization, both academic and non-academic. As a result of their recommendations and subsequent action by the Board of Trustees, a number of changes will be implemented and will be reflected in next year's report.

Public higher education is in a period of transition and major change. The former way of conducting our day-to-day activities will be different from here on. The sweeping changes being made at Clemson underscore our determination to be more efficient and reduce areas of duplication.

Like all organizations, both public and private, Clemson is impacted by external changes, and we must make needed internal changes accordingly. Externally, we see major demographic shifts, such as a shrinking applicant pool, changes in the family structure and the aging of the population. External fiscal constraints are a long-term trend, not a single-year problem.

However, I can assure the citizens of South Carolina that Clemson University will continue to be a good steward of its human, physical and financial resources as it has for more than one hundred years. Clemson will move forward and will continue to fulfill its traditional missions of teaching, research, and public service to the Palmetto State.



Philip H. Prince
President

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UNIVERSITY HISTORY

Thomas Green Clemson, the University's founder, was born in Philadelphia and educated in the United States and Europe. He was a champion of formal scientific education and had a lifelong interest in agricultural affairs and farming.

He came to the foothills of South Carolina when, in 1838, he married Anna Maria Calhoun, daughter of South Carolina's famous statesman John C. Calhoun.

In the post-Civil War days of 1865, Thomas Clemson looked upon a South that lay in economic ruin, once remarking that "this country is in wretched condition, no money and nothing to sell. Everyone is ruined, and those that can are leaving."

When Thomas Clemson died on April 6, 1888, it set in motion a series of events which marked the start of a new era in higher education in the state of South Carolina. Mr. Clemson left most of his estate to be used to establish a college that would teach scientific agriculture and the mechanical arts to the young people of South Carolina.

In his will, he bequeathed the Fort Hill plantation and a considerable sum from his personal assets for the establishment of an educational institution of the kind he envisioned.

In November 1889, Governor Richardson signed the bill accepting Thomas Clemson's gift which established the Clemson Agricultural College, with its trustees becoming custodians of Morrill Act and Hatch Act funds made available for agricultural education and research purposes by federal legislative acts.

Although he also is remembered today for other accomplishments, Thomas Clemson made his greatest historical contribution when his life became intertwined with the destiny of educational and economic development in South Carolina. Although he never lived to see it, his dedicated efforts culminated in the founding of Clemson Agricultural College of South Carolina.

Clemson College formally opened in July 1893 with an enrollment of 446. From the beginning, the college was an all-male military school. It remained this way until 1955 when the change was made to "civilian" status for students, and Clemson became a coeducational institution. In 1964 the college was renamed Clemson University as the state Legislature formally recognized the school's expanded academic offerings and research pursuits. Today, a century after its opening, the University is much more than its founder ever could have imagined or hoped for. With its diverse learning and research facilities, the University provides an educational opportunity not only for the people of the state, as Mr. Clemson dreamed, but for thousands of young men and women throughout the country and the world.

1993-94 ADMINISTRATIVE OFFICERS

Executive

Max Lennon, Ph.D.	President
J. Charles Jennett, Ph.D.	Provost and Vice President for Academic Affairs
Manning N. Lomax, B.S.	Vice President for Administration and Secretary of the Board of Trustees
Milton B. Wise, Ph.D.	Vice President and Vice Provost for Agriculture and Natural Resources
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Benjamin Anderson, J.D.	General Counsel

Academic

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Christopher J. Duckenfield, Ph.D. Vice Provost for Computing and
Information Technology
Joseph F. Boykin, Jr., M.S. Director of Libraries
Robert H. Becker, Ph.D. Director of the Strom Thurmond Institute for
Government and Public Affairs
T. Ross Wilkinson, Ph.D. Dean of Academic Affairs, College of
Agricultural Sciences
James R. Fischer, Ph.D. Dean, Agricultural Research and Director, S.C.
Agricultural Experiment Station
Byron K. Webb, Ph.D. Dean and Director, Cooperative Extension Service
James F. Barker, M.A. Dean, College of Architecture
Jerry E. Trapnell, Ph.D. Dean, College of Commerce and Industry
*Gordon W. Gray, Ed.D. Dean, College of Education
Thomas M. Keinath, Ph.D. Dean, College of Engineering
Benton H. Box, D.F. Dean, College of Forest and Recreation Resources
Robert A. Waller, Ph.D. Dean, College of Liberal Arts
Opal Higgs, Ph.D. Dean, College of Nursing
Bobby G. Wixson, Ph.D. Dean, College of Sciences

*Resigned December 1993; Dr. Bobby G. Wixson named Acting Dean, College of Education.

1993-94 BOARD OF TRUSTEES

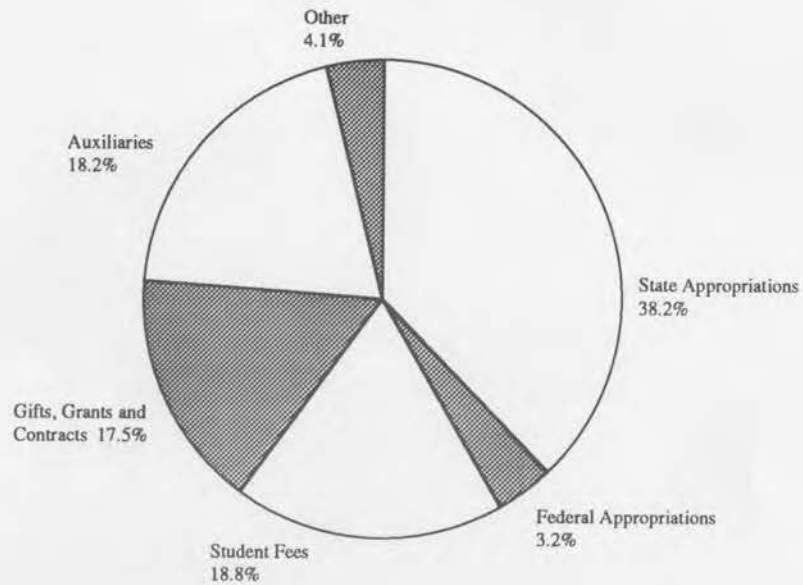
Bill L. Amick, Chairman	Batesburg
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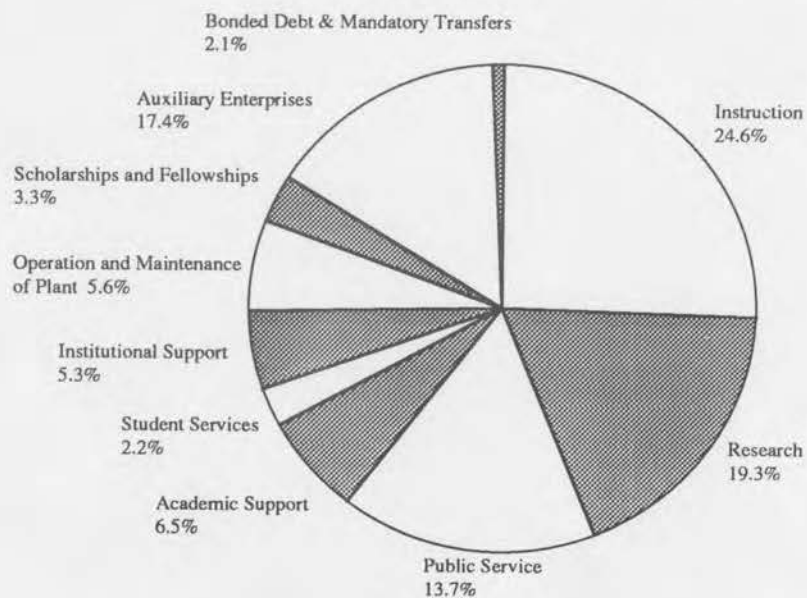
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Paul Quattlebaum, Jr.	Charleston
James C. Self	Greenwood
D. Leslie Tindal	Pinewood
James M. Waddell, Jr.	Beaufort

CURRENT FUND REVENUES AND EXPENDITURES FOR THE YEAR ENDED JUNE 30, 1994

Current Fund Revenues



Current Fund Expenditures



COLLEGE OF AGRICULTURAL SCIENCES

The report of FY '93-94 activities for the College of Agricultural Sciences' academic, research and Extension program is included under the Division of Agriculture and Natural Resources on page 67.

COLLEGE OF ARCHITECTURE

Guided by a clear look at the future, supported by a talented faculty, energized by the University's finest students and enriched by support from public and private partners, the College of Architecture enjoyed its best year ever in FY '93-94. The following benchmarks demonstrate increasing standards of quality for the college:

- Dean Emeritus Harlan E. McClure, FAIA, received the nation's highest award given to an architectural educator. The AIA/ACSA Topaz Award recognized a lifetime body of work in architecture and education that set new directions and national standards. Dean McClure's work is best understood in Clemson, but is highly valued nationally.
- Assistant Professor Gregg Corley received the 1994 National John A. Trimmer Teaching Award for Excellence from the Associated Builders and Contractors in recognition of his outstanding teaching. These national awards to the college dean emeritus and a junior faculty member represent the ongoing commitment to the highest standards of teaching in the college. They also represent a tradition and future of national recognition for teaching.
- The faculty and students in the Department of Planning Studies received a thorough evaluation by an accreditation team which found the department "now positioned to move to national prominence." This department joins the other units in the college in moving closer to our goal as being the finest College of Architecture in the nation, measured against any standard.
- The faculty in the Art Department enjoyed a remarkable record of exhibition of their work during the '93-94 academic year. Their art was selected in some of the most competitive and selective exhibitions in America and seen by a national audience. It is important to note that their work has been seen and critiqued by a smaller, but equally important audience — their students.
- Led by the Department of Construction Science and Management, the college partnership with Associated Builders and Contractors established new benchmarks of success. In weeklong seminars, the ABC/Clemson Academies now have served more than 2,000 continuing education students representing more than 500 companies worldwide.
- An important component of the support that has made such success possible is the Clemson Architectural Foundation whose endowment (including bequests) exceeded \$6 million during the year.

Such achievement would not be possible without a stimulating and supportive context found in the everyday environment of Clemson University and the College of Architecture. We holdup these achievements as representative of the commitment made by all of the faculty, staff and students in the college. The future will

demand that we continue to focus our energies and shape our efforts around our students and the challenges they will face in the future.

Special Programs

The Clemson Architectural Foundation Lecture Series, supported by donations to the Clemson Architectural Foundation, sponsored the following speakers for the academic year '93-94:

Sept. 24	Malcolm Holzman	"Recent Work" CAF Lectureship
Sept. 27	Mario Gandelsonas	"The New Urbanism" Richtex Brick Lectureship
Oct. 22	Steven Holl	"Pre-Theoretical Ground" Architects Boudreaux, Hulstrand & Carter, Ltd. Lectureship
Oct. 23	Aldo Rossi	"Carlo Felice and Recent Work" Holnam, Inc. — Santee Cement Lectureship
Nov. 3-6	Alan Gowens	"Reading the Visible Past: The Documentation of History in Architecture"
	Carole Bleser	"Redcliffe: A Metaphor for the South" CAF Lectureship
Nov. 15	Ricardo Scofidio	"Homebodies on Vacation" Metromont Materials Lectureship
Jan. 31	Marty Beth Edelson	"Fearless" CAF Lectureship
Feb. 14	William Bruder	"Working on the Desert Edge — An Architecture of Pragmatic Poetry" CRSS Architects, Inc. Lectureship
Feb. 28	Merrill Elam	"Recent Work" S.C. Forestry Association Lectureship
March 14	Ray Huff	"Grounding" CAF Lectureship
March 28	David Jagger	"International Construction Economics" CAF Lectureship
April 11	Jorge Silvetti	"Recent Work" CAF Lectureship

The Rudolph E. Lee Gallery is the University's art gallery, and the following exhibitions were shown last year:

Sept. 3-19	Work from the Clemson University College of Architecture Landscape Architecture
Sept. 27-Oct. 27 ...	Photographs by Rob Amberg and Peter Groin
Nov. 3-23	Nikken Sekkei 1900-89
Dec. 3-16	Masters of Fine Arts Thesis Exhibition
Jan. 11-28	Twentieth Century Furniture Classics from Knoll Studio
Feb. 2-5	Southeastern American College Theater — Festival Faculty and Student Design Competition

Feb. 7-March 3.....Craft of the Carolinas
 March 7-April 8Recent Work by Dave Detrich and Dan Overturf
 April 18-27Masters of Fine Arts Thesis Exhibition
 April 29-May 4.....Bachelor of Fine Arts Senior Studio Exhibition
 May 7-June 18Student Honors Exhibition

Department of Architectural Studies

The faculty of the department continues to be active in ways that go beyond being a dutiful teacher and the expected classroom performance. Often their efforts are recognized and bring additional honor to the program. Following are a few of these accomplishments.

- Dean Emeritus Harlan McClure was awarded the Association of Collegiate Schools of Architecture's Topaz Medallion in recognition of his outstanding achievements in architectural education and the lasting impact that students and faculty who have passed through Clemson University's programs have had, and are having, in architecture and the allied arts and in the field of architectural education. The Topaz Medal is the highest award given for achievement in architectural education in North America.
- Professor James F. Barker was elevated to the College of Fellows of the American Institute of Architects for his distinguished achievements in architectural education. Professor Barker ended his term as past president of the Association of Collegiate Schools of Architecture. He also was appointed acting dean of the College of Liberal Arts.
- Professor Harry Harritos staged another successful graphic communications workshop in November. The "investment" of college dollars in the project several years ago has continued to pay dividends back to the department in notoriety and "profit" used to upgrade Professor Harritos' teaching needs.
- Professor Marty Davis organized and staged a Society of Architectural Historians conference at Clemson. Papers were presented by Professor Joe Burton of Architectural Studies, Professor Frances Chamberlain of Planning and Landscape Architecture, as well as papers from faculty from the Art and Architectural History area.
- Professor Lynn Craig became president-elect of the S.C. Chapter of the American Institute of Architects.
- Professor Robert Hogan received a major grant to extend his computer expertise into the area of virtual reality.
- Professor Ray Huff will be a visiting studio critic during the '94-95 academic year at Yale University.
- Three of the five people making up the Design Control Commission of the City of Clemson were faculty members in the department. These were Professor Gordon Patterson (commission architect), Professor Don Collins (commission landscape architect) and Professor Robert Eflin (commission contractor). All served their community in the best tradition of public service.
- The Clemson Architectural Foundation's Charles E. Daniel Center in Genoa, Italy, held its 20th anniversary celebration with a gathering of former students, professors and friends in Genoa and Clemson.

Peer Review

The Peer Evaluation Committee worked for the first time within the new guidelines adopted by the faculty the previous year. Under the chair of Professor

Martin Davis, four tenure-track faculty members were reappointed for the academic year '94-95. One tenure track faculty petitioned for a leave of absence for '94-95 rather than reappointment. The lone applicant for tenure withdrew his request to seek employment elsewhere.

After 25 years of service to the Department of Architectural Studies, a most extraordinary teacher and colleague, Association of Collegiate Schools of Architecture Distinguished Professor and Clemson University Alumni Distinguished Professor Peter Lee, retired.

Problems

But on the down side, additional budget cuts made a damaging impact on the abilities of faculty and staff to engage in personal development activities. The department is not staying current in some areas and struggled to be on the leading edge. A University restructuring task force group currently is looking into ways to address this problem. One possible solution suggested to the task force was to take all of the money being saved by downsizing and use it for developmental education so a smaller faculty and staff could better cope with a "right-sized" University operating force. In the meantime, the department lost funds for graduate assistant positions. Computerizing some paperwork forms would help.

Classroom instruction for staff and faculty, for instance, on newer computer platforms, newer operating systems and newer computer programs, produced much faster and more effective results than trying to self-teach from the instructional manuals. The department sees a radical increase in the number of public service projects as the only short-term hope of dealing with this dilemma. The faculty were pushed to raise dollars via this method and, to some degree, responded.

Pre-Enrollment

- Professor Yuji Kishimoto once again offered his two-week "Architecture Camp" for high school students who had completed their sophomore or junior years of secondary education. Two camps were conducted, one in June and a second in July. These programs saw a total enrollment of 33 students. The department began to see students who came to Clemson in years past for the summer camp program enroll as students in the Architectural Studies Program, the Art Program and the Landscape Architecture Program.
- Professors John Jacques and Harry Harritos conducted a two-week exercise at Furman University for the Governor's School for the Arts.
- Professor Lolly Tai of the Landscape Architecture Program was a faculty member at the Governor's School for the Sciences, held at the College of Charleston. This marked the fifth consecutive year she has been invited back to lecture on issues of the environment. The department includes Professor Tai's efforts in its report as the Governor's School courses also yield students for the Program in Architectural Studies.

Interviews

With the scheduling assistance of Tonia Black of the departmental staff, six faculty members provided orientation visit interviews to prospective students. This activity will continue during the summer as well as during the academic semesters. Nearly 80 students took advantage of this opportunity to gain first-hand knowledge about the department.

First Year

Foundation year professors were Dr. Jane Hurt and Dr. Birsen Doruk, both members of the faculty of the department, Professor Clarence Addison from Construction Science, and Professors Aaron Baldwin and Jim Stockham from the Art Department. Dr. Hurt is the coordinator of the first year instructors.

As in years past, the beginning courses in the College of Architecture were common to Construction Science and Management, Art, Design and Landscape Architecture students. The fact of this core curriculum was one of the major arguments made by the restructuring task force in keeping the College of Architecture intact as a teaching unit during the University's deliberations on restructuring during the late spring and summer months.

Enrollment in first year was at 115 with an additional 30 students enrolled in the summer school "back door" approach to the design and art degrees. As a test of the department's first-year intentions and methods, Professor Aaron Baldwin followed the syllabus, but with different project vehicles. The Art and Landscape Architecture students in Professor Baldwin's section were very pleased with the outcome of the discipline-centered student group for teaching design fundamentals and the language of design communication. Professor Richard Norman had great success in working with a section of "back door" Construction Science majors in a similar fashion this past summer.

Dr. Hurt, in addition to her teaching and coordinating duties, designed the obstacle course, "Mr. McGregor's Garden," that was built for Peter Rabbit's 100th Birthday Party held at the S.C. State Botanical Garden on the Clemson University campus. It proved so popular that the birthday actually was celebrated twice, once in each semester!

Dr. Hurt completed a most unusual commission on Long Island, New York. She designed and had constructed four bathrooms for the Bleser family – at a "shingle-style" house originally designed by McKim, Mead & White.

Second Year

Veteran departmental faculty members who served a tour of duty in second year were shocked by the news that former Brick Association engineer Paul Calvo and his wife Phylliss were on board the USAir flight that crashed in Charlotte. Paul survived. Paul has been a great friend to our program and accompanied our students on many Brick Association-sponsored field trips as far afield as Columbus, Ind. His insight and knowledge about brick are enormous. Faculty and students always learned a great deal during site visits with Paul.

Professor Harry Harritos continued as second-year coordinator, and with his enthusiastic guidance, the "brick experience" continued in second year. Second year sections continued to be too large and the department either must add a section, close the "back door," or raise its grading standard for passage to second year. Second year sections should be no more than 20 students/faculty.

Professor Harry Harritos submitted a paper, co-authored by Professor Robert Hogan and based on a project design by Professor Don Collins, for the Design Communications Association International Conference in Tucson, Ariz. The theme of the conference was "From Hand to Mouse." Professors Harritos' and Hogan's paper was entitled "From Hand to Mouse and Back Again." It explained a recent project that went from sketches to extremely complex computer-generated wire-frame perspectives back to overlaid hand renderings and the benefits of the process. Each of the three principals in the project took part in the paper presentation.

Professor Harry Harritos also received a teaching improvement grant from the University and a McClure Endowment Award from the College of Architecture.

Professor Harry Harritos worked with Professor (and Clemson University Fire Department Captain) Don Collins to complete a fire station in the Keowee Key development.

Third Year

Professor Tom Sammons continued his role as third-year coordinator and once again staged a dynamic New York field trip.

Professor Richard Norman returned to Clemson after a year's sabbatical and a teaching stint at New Jersey Institute of Technology in Newark. Professor Norman used his sabbatical time to broaden his knowledge about teaching and learning in the all-electronic studio — such was the case of the NJIT end of his sabbatical. His effort has brought our students expanded experience with the MacDraw computer program. Now Professor Norman is out to conquer ClarisDraw. He currently is the principal investigator in a joint study award from Autodesk field testing, a new 3-D program called Form Z.

Professor Gordon Patterson adapted a historic store-front commercial building in Westminster, S.C., into a physician's medical clinic. The clinic has served as a catalyst for the revitalization of the village's main street and generated "public service" funds from the town for a landscape architecture student to make a proposal on enhancing the streetscape as well. Professor Patterson also completed design work on two nearby private residences.

Fourth Year

Professor Lynn Craig continued as third-year coordinator even with the quickening pace as president-elect of the S.C. Chapter of the American Institute of Architects.

Fourth year students produced housing schemes both for Clemson University (fall) and Furman University (summer). They also produced a housing scheme for North Augusta, S.C., and a community center for Seaside, Miss.

Professors Lynn Craig and Tom Sammons (from third year) expanded the North Augusta project into an urban design study, which was completed during the summer.

Professor Robert Eflin's Historic Preservation Studio made a trip to Boston during the spring semester. Exhaustive (and exhausting!) walking tours were made throughout the neighborhoods of Boston and Cambridge, studying architecture ranging from early 18th century to today's latest structures.

Professor Robert Eflin's American Architectural Styles class made trips to Madison, Washington, Ga., and Abbeville, S.C., to test their recognition skills of architecture made during the 19th century.

Professor Robert Eflin's "New Directions" seminar students succeeded with its graduates now in medical school, law school, business school and divinity school.

For personal development, Professor Robert Eflin made a trip (with Professor Emeritus Hal Cooledge) during spring break to Spain and Portugal, primarily to visit northern Spain and follow the pilgrimage route leading to Santiago De Compostella, studying Romanesque, Gothic and early Baroque structures along the way.

Professor Robert Eflin performed construction administration on the Keowee Key Fire Station designed by Professors Harry Harritos and Don Collins mentioned earlier. In addition, he designed additions to Corinth Baptist Church in Pendleton (2), the Church of Christ in Clemson, the Unitarian-Universalist Fellowship in Clemson, residences in Pendleton and Seneca, and the Littlejohn Community Center for a Clemson neighborhood.

Post-Baccalaureate

Professor Dale Hutton continued to work with the post-baccalaureate students.

Last year's group was perhaps the largest and most talented that the department has had in the program. The biggest obstacle to growth of the program has been the University's inability to grant Graduate School status to the program's students which would enable them to pay a lower tuition fee. Furthermore, in already having an undergraduate degree, they are not recognized as being eligible for financial aid. In the final decision on where to attend school, many potential students elect to go elsewhere.

The University has begun to recognize this situation and has granted "graduate status" to second-year post-bac students.

In the end, the department may have to make its graduate program three or four years in length and grant "advanced" standing to students with undergraduate architectural design education. In effect, the department would be doing away with the post-bac status and making all students "graduate" in standing.

Graduate

University budgets to the College of Architecture resulted in the reduction by one position of the graduate teaching faculty and a corresponding increase of the student/teacher ratio (Professor Richard Norman returned from NJIT to third year rather than to the graduate program). Nevertheless, a good spirit was maintained by the faculty and students.

Highlights included public service student projects conducted by Professor Peter Lee for a Shoeless Joe Jackson Memorial in Greenville, S.C., and an education/architecture project in Sumter by Professor David Allison's Architecture and Health Studio. Working with Professor Rob Miller, Master of Architecture student Daniel Harding entered an International Bauhaus Competition. Professor David Allison's Architecture and Health Studio drew an all-time high of 20 applicants for just six positions available. This studio has perhaps the strongest class ever in place.

Professor Martin Davis continued his active interest in research. He and his students currently are working on a project exploring interactive video capabilities as they relate to health care issues.

Professor Davis also continued his interest in a joint venture course with Construction Science on the team approach to building without adversarial relationships.

Off-Campus Centers

The 20th anniversary celebration of the Genoa program featured a favorite Italian architect, Aldo Rossi, as a complimentary centerpiece to the center itself. One hundred celebrants in Clemson and Genoa were linked by telephone hook-up for the occasion.

Genoa, however, has become costly for our students and interest in attending has fallen off somewhat. Only some creative work by Carol Hood in recruiting extra students from the Landscape Architecture Program prevented a financial deficit for the upcoming fall semester. The Architectural Studies Program, in particular, and the other college programs, as well, must make a renewed commitment to couple recruiting for the Master of Architecture program with the Mickel Genoa Fellowships to ensure an adequate number of students in residence.

Other revenue avenues also must be explored.

The Charleston Center completed its seventh year of existence, saw a change of the presidency of the College of Charleston, and a name change to the University of Charleston. About 30 students take advantage of this center for remote study each year.

The AIA/Charleston established a grant to support the library at Charleston University in recognition of the University's commitment to the College of Architecture's program in their midst.

Center students took on a studio project for a new library for the University of Charleston. Projects were presented to the Charleston University trustees and president in early spring.

Administration

The end of the '93-94 academic year marked the end of Professor John Jacques stay as head of the Department of Architectural Studies.

Dean James Barker, after consulting with the faculty of the department, asked architectural studies Professor Don Collins to be the acting department head for FY '94-95. Professor Collins, a 22-year veteran of the college, has for the past seven years been the program coordinator for the Landscape Architecture Program.

Joining Staff Head Sandy Elgin and Tonia Black is Michelle McLane who will be responsible for the graduate student records. A part-time accounting position is expected to be filled in early fall.

Summary

Academic year '93-94 was another good year for the department despite the distraction of the University's restructuring trauma! (With the battle plans just revealed, skirmishes have begun along the edges.)

Department of Art

With a strong foundation in teaching as evidenced by the nearly 2,000 students who enrolled in art studio and art and architectural history courses in the '93-94 academic year, the department gave an emphasis to the professional development of the program and the faculty this year. The following contains three items which relate to this emphasis.

The first of these is a departmental "post graduate" teaching opportunity for our M.F.A. graduates who wish to pursue careers in higher education. Three M.F.A. graduates were selected this past year to teach undergraduate courses and, at the same time, develop their professional resume, adding significant creative energy to both teaching and creative research in the department.

The three graduates, Aaron Baldwin, Shane Patterson and Kristin Woodward, distinguished themselves both in the classroom and outside of the University with their creative activities.

- Aaron Baldwin created an exhibition of his sculpture and painting for a two-person exhibition held at the Goin Gallery in Charleston during the Spoleto Festival.
- Shane Patterson taught a workshop and exhibited his creative work in photography at Virginia Intermont College.
- Kristin Woodward was selected to exhibit in the Centennial Celebration Invitational Exhibition at the S.C. State Museum. In addition, she participated in eight regional and national competitive or invitational exhibitions. She presently is a member of the faculty of the Art Department at Mississippi State University.

The second area of contribution to the professional development emphasis was our Visiting Artists/Lecturers program that not only brought other parts of the

country and world to Clemson, but took Clemson back to those places through these individuals. The '93-94 Visiting Artists/Lecturers program included:

- Breon Gilleran, painter, Baltimore, Md.
- Enrico Pinardi, sculptor/painter, professor of art, Rhode Island College, R.I.
- Annie Paule Quinsac, art historian, professor of art history, USC, Columbia, S.C.
- Todd Siler, "artscience" artist, resident artist, MIT, Mass.
- Mary Beth Edelson, artist, New York City.
- Patricia Bollan-Gillen, printmaker, Pittsburgh, Penn.
- Dan Leary, printmaker, Hudson, N.Y.
- Dan Overturf, photographer, professor of art, University of Southern Illinois, Ill.
- Donald Kuspit, art critic, professor of art history, University of N.Y., Stoneybrook.
- Tom Flowers, painter, Furman University, Greenville, S.C.
- Benjo Igwilo, ceramic artist/Fulbright Scholar from Nigeria.
- Ellen Dugan, curator of photography, High Museum, Atlanta, Ga.

The third area was the creative work/research by the faculty. Following is a listing of this activity by six of the department faculty:

- John Acorn — National/International Design Award sponsored by *Landscape Architecture* magazine published in the April 1994 issue. Participated in group exhibition of painting and sculpture at Westbeth Gallery in NYC, May 1994. Received Purchase Award for permanent collection of Anderson County Art Center in Annual Exhibition 1994.
- Sydney Cross — Selected for two national competitive exhibitions, *Paper in Particular* at Columbia College, Mo., and *Art and the Environment* at the Maude Kerns Art Center, Eugene, Ore. Locally participated in the 19th Annual Juried Exhibition, Anderson Arts Center, and a group exhibition of prints at the Fine Arts Center, Greenville.
- David Detrich — Sculpture work selected for two exhibitions, *National Sculpture*, juried exhibition, Fine Arts Museum of South, Mobile, Ala., and the International Sculpture juried exhibition, *5th Annual Small Sculpture Exhibition*, University of Hawaii Art Gallery at Manoa, Honolulu, Hawaii. The exhibition traveled from Hawaii to numerous museums and galleries in the USA, mainland Taiwan and Alaska.
- David Houston — Paper and lecture selected for the Southeastern College Art Association Conference at the University of North Carolina, Chapel Hill, N.C. Title: "New Forms: A Viable Model or Cliche." Selected as a Panelist, "New Forms in the Southeast," held at the Southeastern Center for Contemporary Art, Winston-Salem, N.C.
- Mike Vatalaro — Selected artist in the juried invitational exhibition, *Craft of the Carolinas*, traveled from Gibbs Gallery, Charleston, to Spirit Square, Charlotte, to Green Center for Crafts, Raleigh, N.C. Awarded the S.C. Arts Commission 1994-95 Fellowship for Excellence in the Crafts. Selected for the Southeastern Invitational *Red Clay Survey* Exhibition, Tuscaloosa, Ala.
- Sam Wang — Photography selected for inclusion in the following books published this year: *Photography* by Phil Davis, WC Brown Co., *Beyond the Zone System* by Phil Davis, Focal Press; *Black and White Photography* by Rand and Litschel, West Publishing Co., *Exploring Color Photography*

by Brown and Benchmark. Computer art work included in *Algorithmic Art Show* at Xerox PARC, Palo Alto Research Center, Calif.

Department of Construction Science and Management

The undergraduate and graduate programs maintained the same level of enrollment as the previous year of 115 and 17 graduate students, respectively. With the current number of faculty in the program and the demands of industry for our graduates, these were very manageable numbers. The program also maintained a 92 percent placement rate for its graduates. Because of the economic improvement of the construction industry, the department experienced an increase in the number of companies which recruited its students. As the program's visibility increases nationally, so does the number of companies seeking its graduates. And because of the high quality of the faculty, students and program, most of the companies who recruit return year after year.

During the year the department was in transition. Roger Liska became associate dean of the college and also served as department head for one semester. Professor Clarence Addison was named acting head for spring and summer semesters while a national search for a new department head was conducted. Charles Matthewson, formerly with Southern Illinois University's construction education program, was selected for the position.

Faculty

During the past year the faculty has been actively involved in not only their instructional responsibilities, but also integrating research and service activities into their teaching. Some of the more significant activities and events pertaining to the faculty are noted below:

- Kirk Bingenheimer left the department to take a job with a residential developer/builder in Columbia, S.C. Christine Piper, who taught previously in the department, will return to assist in the construction management undergraduate and graduate courses.
- Clarence Addison continued to develop video-based instructional units for some of the classes he taught. This provided students with the opportunity to review concepts covered in class at their own time and pace.
- Norman Book continued to develop a computer-based assisted educational program which can be used by architects and constructors in the structural analysis and design process.
- Gregg Corley received the 1994 National John A. Trimmer Teaching Award of Excellence from the Associated Builders and Contractors in recognition of his outstanding teaching. He continued in his role as national director of the Associated School of Construction. He taught various continuing education courses for the construction industry. Finally, he was active in research on computer software integration.
- Francis Eubanks became the editor of the refereed journal of the American Institute of Constructors. He also was a member of the national board of directors of the organization. He taught in various continuing education courses for the construction industry and presented papers at various national construction association meetings.
- John Mumford assumed the duties of undergraduate adviser for the department. He was active with the National Association of Home Builders and served on the board of directors of the local chapter. He planned and conducted the first one-week summer construction enrichment camp for high

school students interested in construction as a career. Finally, John continued his studies on interdisciplinary teaching and presented papers on the subject at national construction educational conferences.

- David Egan was on sabbatical leave.

During the year the faculty and staff in the department were involved in the following funded research/educational development projects:

- Development and maintenance of a construction craft certification process for an international construction company.
- Began the development of a national construction manager certification examination for Construction Management Association of America.
- Began the development of educational materials for new first line construction supervisors. This effort was sponsored by the Associated Builders and Contractors.
- Continued to maintain the national testing program for the Construction Certified Associate program for the National Association of Women in Construction.
- Completed a major study on the training for the Carolinas AGC Chapter.

The department continued to work with the Associated Builders and Contractors Construction Education Foundation in facilitating fifteen continuing education Academies for supervisors, project managers, safety managers, estimators and executive managers. This effort is the largest of its kind worldwide. To date nearly 2,000 people from more than 500 companies worldwide have received training at the Clemson Academies. The partnership with the Construction Education Foundation recently has expanded to discussions on locating the first national construction education and research center at Clemson.

The department also was very active in development and fund-raising activities. Sufficient funds were raised from alumni and construction companies to match one-time University monies to purchase the necessary computer hardware and software for a construction estimating and scheduling laboratory. In addition, the annual department golf tournament resulted in raising sufficient funds to allow students to travel to and participate in many national meetings of construction-related associations.

Department of Planning and Landscape Architecture

The '93-94 academic year marked a milestone with the merger of Planning Studies and the Landscape Architecture Program into the new Department of Planning and Landscape Architecture. New initiatives will be explored to maximize the benefits of the merger through joint activities, cross-listing of courses, team teaching and student advisement.

During the year both programs were reviewed for accreditation by their respective accrediting bodies, leading to recommendations for full accreditation in both cases.

Planning Studies

The '93-94 academic session marked the 26th year of the planning program at Clemson.

Curriculum

Discussions leading to curriculum review were held during the academic year. The focus was to streamline the core in planning and to address strategic planning issues. Opportunities relevant to the merger between the Planning and Landscape Architecture programs were brought to the discussion. There were two retreats devoted to this effort with the objective of strengthening the concentration areas in physical planning, urban design and environmental planning that comprise the new focus of the planning program.

Accreditation

After the review of the program by a site visit team and the Planning Accreditation Board, the City and Regional Planning program was reaccredited for another five years. With minor recommendations, the site visit team reported on the significant improvements and strengths that they found since the previous accreditation review in 1988. Among other things, they felt that Clemson's planning program is now positioned to be one of national importance. An interim report must be submitted next year to address the progress in areas of improvement suggested by PAB.

Faculty

A few changes took place in the composition of the faculty. First, one new position was created with University set-aside funds for Grant Cunningham as assistant professor of planning. Second, a position of adjunct professor was created for Umit Yilmaz who joined our faculty for the year. Also, Bob Bainbridge continued on a temporary position covering for the regular position that remained vacant during the year. Faculty initiatives and accomplishments are listed below:

Bob Bainbridge

- Was a full-time visiting assistant professor occupying the vacant position in the department; taught the following classes:
 - Site Planning,
 - Planning Process and Administration,
 - Growth Management and Legal Issues,
 - Historic Preservation Planning,
 - Thesis and Terminal Project, and
 - Directed Studies in City and Regional Planning.
- Continued as president of the Palmetto Trust for Historic Preservation.
- Bob was involved in a number of public service projects as listed in the following section.

Kerry Brooks

- Received tenure and promotion to associate professor of planning studies; taught the following courses:
 - Introduction to Geographic Information Systems,
 - Advanced Geographic Information Systems,
 - Planning Methods,
 - Comprehensive Planning Studio (with Professor Barry Nocks),
 - Thesis and Terminal Project, and
 - Directed Studies in City and Regional Planning.

- Was involved in grants and public service projects as outlined in the following section.

Jose Caban

- Continued as department head; taught the following classes:
 - Urban Design,
 - Advanced Physical Planning/Urban Design (with Professor Umit Yilmaz),
 - Metropolitan Planning Studio (with Professor Umit Yilmaz),
 - Thesis and Terminal Project, and
 - Directed Studies in City and Regional Planning.
- Presented a paper: "Elements of Quality of Urban Life in North America" at an international conference sponsored by the University of Rosario and the Institute of Architects, Argentina.
- Conducted a two-day presentation on the topic of "American Urbanism," invited by the Center for Environmental Studies in La Plata, Argentina.
- Executive Board, S.C. American Planning Association.
- Editorial Board, *Urban Design and Preservation Quarterly*.
- Editor, Palmetto Planner, Quarterly Review of the SCAPA.
- HUD work-study program coordinator.
- Was involved in grants and public service projects as outlined in the following section.

Grant Cunningham

- Completed a draft of his Ph.D. dissertation. Was in charge of general coordination and advisement of all thesis and terminal project students. Taught the following:
 - Topics in Planning Communications,
 - Thesis and Terminal Project, and
 - Directed Studies in City and Regional Planning.
- Was involved in grants and public service projects as outlined in the following section.

Jim London

- Was a tenured associate professor of planning studies; taught the following classes:
 - Planning Methods,
 - Environmental Planning,
 - Coastal Planning,
 - Economic Development Planning,
 - Thesis and Terminal Project, and
 - Directed Studies in City and Regional Planning.
- Was involved in public service projects as outlined in the following section.

Barry Nocks

- Taught the following classes:
 - Planning Theory,
 - Quantitative Methods for City and Regional Planning,
 - Health and Social Policy Planning,
 - Comprehensive Studio (with Professor Kerry Brooks),
 - Thesis and Terminal Project, and
 - Directed Studies in City and Regional Planning.
- Published two book reviews: *Leadership for the Common Good* by Bryson and Crosby in the *Journal of Public Administration Strategic Planning for Local Government* by Gordon in *Rural Perspectives*.
- Served as expert witness in two DHEC administrative hearings on the issues of open heart surgery for Aiken County, and home health services in the Low Country.
- Presented a paper at ACSP Conference: "Strategic Planning for New Governance."
- Continued consulting activities with the National Economic Development Institute and the National Rural Development Partnership.

Umit Yilmaz

- Was an adjunct professor for the year; taught the following classes:
 - Advanced Physical Planning/Urban Design (with Professor Jose Caban), and
 - Metropolitan Planning Studio (with Professor Jose Caban).

Research, Public Service and Grants

The department was actively involved in various projects, studies and service activities during the year. Following is a summary of those activities:

Comprehensive Development Plan for Lower Richland County	Sunrise Foundation	Bainbridge	\$11,535
Historic Neighborhood Surveys: Overbrook, Ware/McCall/Perry	City of Greenville	Bainbridge	N/A
Clemson Open-Space Plan	City of Clemson	Brooks/Nocks	N/A
Study of the Homeless in Greenville, S.C	Greenville Homeless People's Special Agencies	Brooks/Nocks	Book Grant
Coastal Zone Rural Economic Development Through Enhanced Linkages to Resort Growth Centers	NCRI	Brooks, et.al.	\$162,730*
Change Analysis of Chatooga Watershed	Chatooga Watershed Coalition	Brooks	\$9,800
Data base Development	S.C. Department of Commerce	Brooks	\$3,125

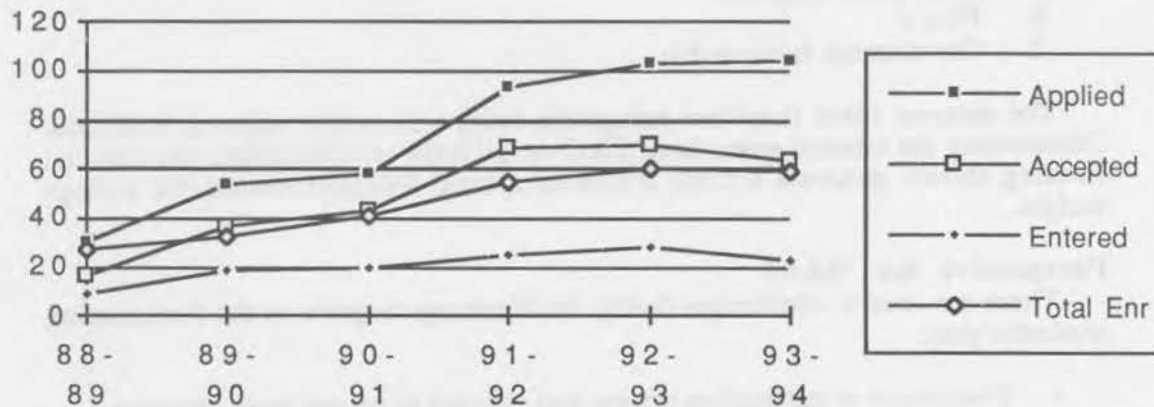
Development Options for the Upper Peninsula of Charleston	City of Charleston	Caban/Yilmaz	N/A
Master Plan for Two New Campuses for Greenville Technical College	Greenville Technical College	Caban/Yilmaz	\$5,000
HUD Work-Study Program	Department of Housing and Urban Development	Caban	\$73,894*
Evaluation of Execution of S.C. Coastal Management Program	Coastal Council and Sea Grant Consortium	Cunningham	\$6,000
Inventory: Sites and Facilities for Outdoor Recreation in the Charleston Harbor Area	Charleston Harbor Project	Cunningham	\$5,000
Environmentally Sensitive Development Along the Coast	S.C. Sea Grant Consortium	London	\$1,000

* Including calculated CHE Match

Recruitment and Enrollment

The growth trend experienced in the past three years continued, with only a slight decline, despite stricter admission standards applied to curtail excessive enrollment. We expect this pattern to continue for as long as the national economy is depressed, with the resulting decline in employment opportunities.

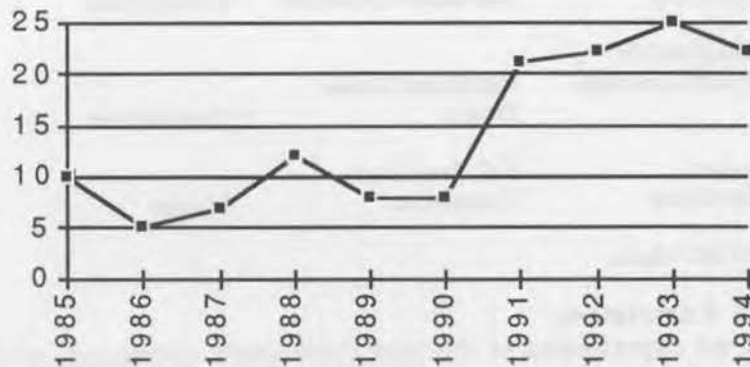
CRP Five-Year Enrollment Profile



Graduation Rate

By May 1994 the program had graduated 264 students with the Master in City and Regional Planning degree. Although that represents an average of 11 graduates per year since the first graduation in 1970, this rate has escalated in recent years. The following chart shows this rate over the past 10 years.

Graduates 1985-Aug. 1994



Financial Aid

Forty students (70 percent of total City and Regional Planning enrollment) received some form of financial aid during the academic year distributed as follows:

- 15 Department TA's
- 4 Department RA's
- 13 HUD grant recipients
- 6 PSA's
- 2 Government sponsorship

The amount spent (top four categories only) was in the order of \$185,000. Discounting the amount spent from E&G on graduate assistantships, the external funding should generate a CHE match of around \$40,000 toward the college budget.

Perspective for '94-95

There are several challenges facing the Planning program in the forthcoming academic year:

- Conclusion of curriculum review and changes to course work structure.
- Completion of a strategic plan and outcome assessment plan.
- Development and implementation of a minority recruitment plan.

Landscape Architecture

Accreditation

The program in Landscape Architecture received initial accreditation review in fall of 1993, resulting in accreditation for a two-year period which is the standard

procedure for new programs. A report for FY '93-94 has been submitted to the Landscape Architecture Accreditation Board.

Enrollment and Graduation Rate

Enrollment in the program continued at 64, the same as the previous year. During the past three years, the ratio of in-state to out-of-state students has been the following:

1991-92	4.0 : 1
1992-93	4.3 : 1
1993-94	3.3 : 1

This ratio is in keeping with the original mission of the program to serve predominantly S.C. students who otherwise had to leave the state to study Landscape Architecture. Graduation rate during the past three years has been the following:

1991-92	1
1992-93	15
1993-94	12

Faculty

Frances Chamberlain

- Presented a paper at the annual SE Region SAH Conference: "Le Notre's Kit of Parts as seen at the Vaux le Visconti and Chantilly."
- Student installation: "Hegarth Line of Beauty in the Southern Landscape."
- Student project to redo a historic Pendleton walking tour map.
- Selected to attend national symposium on the Teaching and Scholarship of Landscape Architecture History at Penn State.
- Began work on the translation of architecture dictionary from German into five other languages, editing and revising English portion with architecture Professor Joseph Burton and colleagues from Berlin. Added 100 words for landscape architecture.

Don Collins

- Completed design work (with architecture Professor Harry Harritos) on:
 - Keowee Key Clubhouse expansion,
 - Keowee Key Pro Shop, and
 - Lynch Drug Co. expansion.
- Completed construction of Keowee Key Fire Station.

Lolly Tai

- Received tenure as associate professor of landscape architecture.
- Continued to be involved in professional practice.
- Completed work on a shopping center near Myrtle Beach and on the Hilton Head Island City Hall.

Conclusion

The most eventful accomplishment this year, the merger of Planning and Landscape Architecture, has taken place with a great deal of success and promise of new initiatives under the new academic structure. Both programs received accreditation for the maximum period allowed in each case.

Both programs continue to flourish. Enrollment is at the desired level and the quality of students continues to be strong. In City and Regional Planning, average GRE and GPR figures increased again this year.

Involvement in public service, research and grants in general produced 13 projects with individual performance by our faculty or partial involvement of our faculty with others across campus and a gross dollar value of \$278,084.

There was a reasonable level of participation in professional meetings and conferences despite financial constraints in travel.

COLLEGE OF COMMERCE AND INDUSTRY

The College of Commerce and Industry had an active and productive '93-94 academic year. The college embarked on a strategic planning initiative with a core team of faculty, staff, administrators and students. The planning effort was facilitated by consultants from Ernst & Young through an in-kind grant of \$100,000 of services to the college through the strategic planning partnership program of the Ernst & Young Foundation. The college presented collegewide teaching awards to Dr. Richard Aspland, professor in the School of Textiles, and Dr. Mark McKnew, professor in the Department of Management. The college's Community Service Award was presented to Dr. Holley Ulbrich, professor of economics. Private financial support and research funding reached record levels during the year. Major events in these areas are outlined in the sections below.

School of Accountancy

During the '93-94 academic year the School of Accountancy made notable achievements in teaching and curriculum innovation, scholarship and service to the University and profession. Many faculty members received grants and awards for innovative teaching and course design. Professors Alison Drews-Bryan and Jim Davis received the college's first innovation fund grant to assess the effect of teaching innovation in introductory accounting. Drews-Bryan also won the top award in the 1993 Southern Business Administration Association Innovations Program, selected from 30 entries. Professor Hubert Glover received a teaching innovation grant to study the effects of group learning versus lecture, and he also won the school's Outstanding Teacher Award. Professor Lew Bryan received a University Innovation Fund Award, along with other faculty in the colleges of Commerce and Industry, Architecture and Engineering, to develop an interdisciplinary course for majors in those colleges. Professor Jeffrey McMillan won a First Union research grant to study student attitudes and perceptions about academic dishonesty. Professors Ralph Welton, Jim Davis and Mike LaGrone published an article in *Accounting Education* about instructional design and assessment for promoting the moral development of accounting students. Professor Jean Price is completing an introductory accounting textbook that focuses on using accounting information.

Our internal auditing program continues to flourish under the leadership of Professor Tom Friedlob. The courses, internships and support from the internal auditing profession make the program one of the most successful in the nation.

Faculty scholarship contributed significantly to academic and professional knowledge during the year. Faculty member publications and presentations covered a wide variety of topics in a broad array of highly reputable journals and conferences.

Student activities were particularly impressive this year. Our Beta Alpha Psi chapter was designated a superior chapter — the highest award a chapter can receive from the national organization — for the third straight year. In addition, two of our chapter members, Brent Johnson and Theresa Kraft, placed first and third, respectively, in the nation in Beta Alpha Psi's manuscript contest. Brent also was appointed to serve a two-year term as an alumni representative on Beta Alpha Psi's national board of directors. Our Accounting Club was very active during the year, offering several informative seminars for our students.

A large majority of faculty members made substantial contributions in serving the University and the accounting profession. Many faculty members served on committees involved in strategic planning for the college and University and in the restructuring of the University. Faculty also held a variety of offices in local, regional and national academic and professional organizations.

Several personnel changes occurred in the school this year. Jerry Trapnell was appointed dean of the college and Alan Winters was appointed director of the school. Ralph Welton and Jeff McMillan were promoted to full and associate professor, respectively, and Professor Jim Turner retired.

Department of Economics

During the '93-94 academic year the Department of Economics continued to develop and improve its undergraduate and graduate programs. The department now has more than 130 undergraduate majors and 50 graduate students. Its graduate program continued to be supported by grants from Earhart Foundation, the Liberty Foundation and E.I. du Pont. Furthermore, the program was enhanced by a gift of \$42,000 from the Lynde and Harry Bradley Foundation, the purpose of which is to support dissertation research and provide for a visiting scholars program. The first visitor will be Professor Robert Tollison, director of the Center for the Study of Public Choice at George Mason University.

Major revisions, both to the B.A. and B.S. curricula, took effect in the spring semester of 1994. The revised curricula upgrade the course offerings in the major and make the major more appealing to a wider range of students. Initial student reaction has been very positive. As in past years, the capstone event of the year is a visit to the campus by a leading economist under the auspices of the Harris visiting professor program. This year's Harris visiting professor was Arnold Harberger of UCLA, one of the nation's leading experts in the economics of development. He gave an after-dinner talk to faculty and senior undergraduate majors, taught several undergraduate classes and engaged many in private discussion. By all accounts, he was a big hit with students and faculty. The Ellis Ivey family contributed \$10,000 to provide a scholarship for an undergraduate economics major.

The department continued its emphasis on high-quality research, with articles appearing in such journals as the *American Economic Review*, the *Journal of Finance*, *Journal of Law and Economics* and the *Journal of Money, Credit and Banking*. Department members also delivered numerous conference papers, wrote book chapters and served as journal referees. Several members received special recognition. A session of the Western Economic Association meetings was held in

honor of Donald Gordon, who just retired from the Abney Chair of Free Enterprise and was a past president of the Western Economic Association. David Gordon was named a visiting scholar by the Federal Reserve Bank of Atlanta. Debby Payne was named the University's outstanding graduate teaching assistant. Dan Benjamin took a leave of absence to teach and do research at Montana State University.

Department of Finance

Several significant accomplishments occurred in the Department of Finance during the '93-94 academic year. In the area of teaching, the department continues to benefit from the NationsBank Communications Initiative. Because of these funds, many different techniques were used in the classroom to improve the communication skills of financial management students. The department also was able to recognize teaching excellence thanks to the John L. Cote Jr. Fellow Award that went to Professor Richard Klein.

Research contributions by the finance faculty appeared in some leading journals in the field. These journals included *The Journal of Finance*, *The Journal of Banking and Finance*, *Managerial and Decision Economics*, *The Journal of Business and Economics*, *Journal of Applied Corporate Finance*, *Financial Management*, *The Financial Review* and the *Journal of Real Estate Finance and Economics*. Professor John Alexander received the outstanding paper in investments award from the Eastern Finance Association.

In the area of service, several faculty served on college and University committees. Professor Richard Klein served on the board of directors of the Southern Carolina's chapter of the Financial Executive Institute. One of the most exciting things in the service area is the founding of the Financial Economics Network on the Internet by First Union Professor Wayne Marr along with a Harvard professor. Another professor, John Harris, spoke to a United Nation's conference in Switzerland about financial derivatives. In addition, Professor Mike Spivey was awarded an Ayers Fellowship to the Stonier School of Banking.

Legal Studies Group and the Center for Policy Studies

In '93-94 the Legal Studies Group, which has six faculty members at Clemson and two, on leave, in the International M.B.A. program in Pordenone, Italy, experienced increased enrollments in undergraduate and graduate law and policy courses. Reflecting the realities of the business world, record demands are being experienced for basic courses that introduce students to the legal and regulatory environment of business. Growing interest is shown in the Group's courses that focus on international law and regulation, construction law and real estate law. The Group, which also operates the Center for Policy Studies, expanded its public service activities and experienced notable successes in obtaining private support for faculty/student research and publications. During the year the Group initiated an effort to increase the amount of written work in all courses. Improvements currently are being implemented.

Highlights for the year include:

- Sponsorship of a Strom Thurmond Institute program on national health care policy, with Bob Helms, director of health economics studies, American Enterprise Institute.

- The first Robert Staaf Memorial lecture on liberty and the law, with Clint Boliek, director of litigation, Institute for Justice, Washington, D.C. This will be an annual event.
- Invited participation by faculty for sessions held in Paris and London.
- Four faculty members invited to write chapters in a book on property rights.
- Initiation of weekly student research seminars on environmental law and policy.
- Faculty participation in a U.S. EPA superfund reauthorization conference.
- Faculty presentation to members of U.S. Senate on environmental risk assessment.
- Faculty participation in economic education programs for public school teachers.
- Publication of a book on environmental policy coedited by a Group faculty member.
- Six faculty articles in professional law reviews and journals.
- Faculty participation in distinguished lecturer series at Brigham Young University and George Mason University.
- Financial support for faculty/student support obtained from Eastman Chemical Co., E.I. du Pont, the American Farm Bureau Federation, the Political Economy Research Center, the Roe Foundation and the Environmental Issues Council.
- Publication of a quarterly newsletter on the economic situation in South Carolina.
- More than 30 public presentations to civic, professional and industry groups.
- Publication of four Center for Policy Studies special reports on banking in South Carolina; the S.C. Superb Fund for underground storage cleanup; improving the management of water pollution control in river basins; and environmental risk assessment.

Department of Management

The Department of Management continued to improve the quality of its programs in '93-94. Management faculty incorporated a two-semester foreign language requirement into the curriculum for all undergraduate management and industrial management majors and designed a management orientation course to introduce the department's freshmen to career opportunities, professional organizations and curriculum options in their field of study. In addition, the faculty conducted a comprehensive review of the Master of Science in Industrial Management program, creating a structured curriculum that promotes team activity and culminates in a significant field project.

The department provided a variety of professional development opportunities for undergraduate and graduate students through sponsorship of the following organizations: American Production and Inventory Control Society, Data Processing Management Association, National Defense Transportation Association, Project Management Institute, and Society for Human Resource Management. These organizations were very active in '93-94, sponsoring a variety of guest speakers, field trips and seminars that gave students opportunities to interact with management professionals.

Management faculty made significant contributions to the literature in '93-94, with publications in leading journals including *Decision Sciences*, *Strategic Management Journal*, *Journal of Applied Psychology*, *Journal of Managerial Finance*, *Organizational Development Journal*, *Journal of Operations Management*, *European*

Journal of Operations Research, International Journal of Flexible Manufacturing Systems, Journal of Business and Psychology, The CPA Journal, and Computer and Operations Research. In addition, faculty in the Department of Management served the profession as editorial board members of the *Journal of Operations Management, Production and Operations Management Journal, Journal of Management, Journal of Managerial Issues, Computers and Operations Research, Production and Inventory Management Journal*, and the *Southern Business Review*.

The department continued to receive strong external support through funded research, gifts and industry partnerships. Management faculty received research funding in '93-94 from the National Science Foundation, Defense Logistics Agency, Small Business Administration, McDonnell Douglas Space Systems and NCR (AT&T Global Information Systems). In addition, department faculty worked on projects with Schlumberger, Sonoco Products and Unimark Plastics. Significant equipment donations supporting teaching and research in operations management, simulation modeling and statistical process control were received from MAPICS Incorporated, Pritsker Corp. and METRSCOPE, respectively. In addition, Duke Power announced a commitment to establish the William S. Lee Distinguished Professorship in Total Quality Management in the department and began a fund-raising campaign to endow the position.

Several management faculty members received professional recognition for their activities in '93-94. Professor Mark McKnew was recipient of the Joseph J. Lyons Distinguished Teaching Award in the College of Commerce and Industry. Professors Caron St. John and V. Sridharan were selected by their colleagues to receive the Department of Management Scholarly Achievement Award. Professor Terry Leap received national recognition in the *Chronicle of Higher Education* for his book, *Tenure, Discrimination and the Courts*. On the international scene, Professor David Grigsby was named Fulbright FLAD Chair in Market Globalization and will lecture at the Technical University of Lisbon in Portugal, while Burlington Professor Jack Kanet was the Konrad Zuse Guest Lecturer at the University of Erlangen/Nurnberg in Germany. In recognition of their contributions to the department, Professors Rick Clarke and Caron St. John were awarded tenure.

Department of Marketing

The '93-94 academic year began the second decade in the history of the Marketing Department. The department emerged from the old Industrial Management Department in 1982 with eight tenure-track faculty, three of whom were business law professors. In 1986 the B.S. degree in marketing was approved and, two years later, the business law faculty moved to the Economics Department. Presently, the Marketing Department has 12 tenure-track faculty members, approximately 400 majors and more than 500 students from other units pursuing a minor or concentration in marketing. During the '93-94 academic year 105 students graduated with B.S. degrees in marketing.

The eight-year-old Marketing Department curriculum continues to evolve to better meet the needs of our constituents and adjust to changing AACSB accreditation guidelines. Most notably, an international requirement has been added and the communications requirement expanded. The three study areas, technical, services and general marketing, are firmly in place with an increasing number of students opting for the more specialized technical and services options. Dow Chemical continues to support our technical option with a \$1,000 scholarship for a rising senior. The Selling/Behavioral Studies Lab now is a reality and will be utilized by approximately 200 students in seven sections of MKT 420 (professional selling) during the upcoming academic year.

The Department of Marketing had an excellent research productivity year in '93-94. Five faculty members had three or more journal articles published or accepted for publication. This past academic year the faculty's research was published in the *Journal of Consumer Research*, *Journal of Advertising*, *Journal of Marketing Theory and Practice*, *Journal of Marketing Education*, *Journal of Public Policy and Marketing*, *Journal of the Academy of Marketing Science*, *Journal of Current Issues and Research in Advertising*, *Journal of Personal Selling and Sales Management*, *Services Industry Journal*, *Advances in Environmental Marketing*, *Journal of Marketing Education*, *Journal of Services Marketing*, and the *Journal of Product and Brand Management*. The marketing faculty also presented numerous papers at the American Marketing Association conferences, the Academy of Marketing Science meeting, the macromarketing conference, the services marketing conference, the Southern Marketing Association conference, the World Future Society conference, American Association of Higher Education conference, S.C. Higher Education conference, the Southeast Region of the Decision Science Institute meetings, meetings of the Technology Transfer Society, the Symposium on Patronage Behavior and Retail Planning, and the Quality Management in Services conference.

Almost all the marketing faculty now either serve on the editorial review boards of leading scholarly journals or serve as regular reviewers for these journals; several hold offices in local, regional and national marketing associations. Also, a faculty member has been named editor of the prestigious *Journal of Advertising* to begin serving in January 1995.

The year '93-94 was one in which great strides were made to serve our students better and work with external publics. The first two issues of "The Market Place," the Marketing Department's alumni newsletter was published and distributed. Groundwork was laid for an interdisciplinary team-taught senior seminar for marketing and other Commerce and Industry students along with those of the colleges of Architecture and Engineering. The American Marketing Association student chapter expanded participation in its "Shadowing" Program to include 20 businesses and 40 students. Several faculty had members of the business community speaking in their classes. Companies sending representatives to speak to marketing classes were: Milliken, AT&T/NCR, Michelin, Sonoco, AFLAC, Wallace Computer, Hercules Inc., AT&T Global, UARCO, ADP Co., Dow Brands, First Sun Trust, AET Packaging, Bi-Lo, ALSiMaq and Gold Kist.

Marketing research and marketing management classes also had students engage in projects with some of the area's small businesses. Several projects are under way with one or more faculty members working in SCUREF technology transfer areas. Funding is expected for these endeavors. In order to take advantage of this increasing external interaction, two new faculty committees have been formed. One is responsible for coordinating co-ops and internships. The other is charged with business and alumni relations.

Office of Professional Development

A strategic shift from seminar to conference production began paying off handsomely for the Office of Professional Development in FY '93-94, as PD served more than 61 percent of its customers in conference settings.

A record number of the 21,000 professionals who sought quality adult continuing education offered by PD attended conferences as opposed to seminars. Conferences are one- to five-day events with multiple speakers, and seminars are one- to three-day events with only one or two speakers.

Conferences held in venues across the nation attracted 12,870 people principally in 110 professional women's, textile and management conferences.

Two conferences deserve particular note – “How to Challenge, Motivate and Build Your People to Achieve Organizational Excellence” and “Benchmarking High Performance Work Teams.” Both conferences were highly successful, exhibiting growing strength and recognition in their respective markets.

“Organizational Excellence” attracted 520 top executives to San Diego, Calif., in May 1994 to hear the likes of Tom Peters, Joel Barker, Jim Belasco, Richard Schonberger, Warren Bennis, Jack Stack and Carole Leland – all nationally recognized experts in their respective fields of management.

Also on hand were top executives from Tennalum – a division of Kaiser Aluminum — and the Gates Rubber Co., dual winners of the conference’s 21st Century Organizational Excellence Award.

More than 1,400 people have participated in the Organizational Excellence conference since its inception in 1992. The 1995 conference is scheduled for May 22-24 in New Orleans.

Meanwhile, PD also offered its second and third “Benchmarking High Performance Work Teams” conferences in Orlando and San Francisco. Each featured overviews of 10 world-class organizations and their strategies for implementing team approaches. Both conferences attracted 140 people.

The relevance of the conference and its outstanding nationwide reputation then led to a blockbuster event in August 1994 in Orlando which attracted a phenomenal attendance of 340 people. Additional “teams” conferences are planned for Scottsdale, Ariz., and Washington, D.C., throughout the remainder of 1995.

Other highlights for the year included:

- Outstanding growth in high-end technical seminar enrollment from 3,300 in FY '92-93 to 5,015 in FY '93-94. Topics included industrial barcoding, maintenance management, supplier certification, warehouse operations, using the Baldrige criteria to achieve TQM, custodial staffing and standards, slashing facility costs set-up reduction, incentive compensation planning and demystifying ISO 9000.
- In-house training continued to grow as PD conducted more than 100 on-site training programs for 1,156 customers in 60 companies.
- PD continued its international outreach, training people in management and textile disciplines in Pakistan, Egypt, Mexico, England, Australia and New Zealand.
- PD offered new conference products in these areas: re-engineering, customer service, women in leadership, crystalline silica, membranes and filtration systems, and organizational change.

Small Business Development Center

The Clemson University Regional Small Business Development Center (SBDC) continued to assist the small business community in the 11 northwest counties of Upstate South Carolina. The College of Commerce and Industry fosters economic growth and development through four Upstate SBDC offices located in Greenville, Spartanburg, Greenwood and Clemson. For the year ending December 31, 1994, the Clemson SBDC will assist approximately 1,100 new clients in addition to our existing clients which return on a regular basis for business assistance. The SBDC will finish 1994 well in excess of current SBA goals. In addition, the Management Training Division will conduct more than 22 seminars on current and diverse small business topics. The Management Training Division will be offering an intensive Small Business Journey course in conjunction with NationsBank in 1995.

The center's core program of management assistance and training is funded by the Small Business Administration, the state of South Carolina and the College of Commerce and Industry at Clemson University. The SBDC is focusing on small existing businesses that have an opportunity for growth, capital formation and job creation in addition to encouraging entrepreneurship. Through July 1994, the Clemson Regional SBDC had assisted in the development of loan proposals totaling \$4,253,500, including \$1,450,000 to minority and women-owned businesses. The SBDC's goals for 1995 include an increase in capital formation for minorities and women-owned businesses through increased activity with the Small Business Administration. In addition to the core program, the center administers a Defense Logistics Agency grant which is used to assist small-business owners with locating and bidding on state and federal contracts. In addition to government contracting, this program has been on the forefront of assisting small-business owners in obtaining subcontracts for the building of the BMW plant in Greer.

The Clemson Regional SBDC also has entered into a cooperative agreement with the EDI of South Carolina to provide in-depth financial and marketing assistance to small and medium-sized manufacturers in the Upstate. The agreement for the SBDC Manufacturing Field Office to be co-located with the Southeast Manufacturing Technology Center is an annual renewable \$180,000 grant provided by NIST for three years. The office will employ two consultants and one secretarial support person.

The Clemson Regional SBDC has new leadership in three of its offices. Jill Burroughs has been promoted to area manager in Clemson. Susan Dunlap is the new area manager in Greenville and Jon Keagle is the new head of our Spartanburg office. With the new leadership and increasing focus on existing businesses, the Clemson Regional SBDC will have a large impact on the small business community in the Upstate in 1995.

School of Textile, Fiber and Polymer Science

The '93-94 academic year was another busy year for the School of Textiles, Fiber and Polymer Science. With third-year funding of \$1.81 million for the National Textile Center and numerous other research contracts, sponsored research exceeded \$2.2 million. Work on these contracts involved 14 faculty and supported approximately 30 graduate students. An additional \$1.7 million in sponsored research was carried out at Clemson Apparel Research (CAR). In addition to the sponsored research, the consulting work carried out by CAR as a part of the Southeast Manufacturing Technology Center with small apparel companies has grown significantly over the past year. Further, we have had subcontracts with four different shirt makers with production commitments as high as 2,000 shirts per week. Having these production-oriented efforts in a research environment has allowed us to carry out research in a more "real world" situation.

During this year the school graduated one Ph.D. student, two M.S. students and 33 B.S. students. Placement of these graduates continued to be high as in previous years. Enrollment in the undergraduate programs again was slightly lower than in previous years with 142 students enrolled in the three undergraduate programs in September 1993. However, graduate enrollment increased to 37 as a result of the increased support for assistantships through sponsored research.

We have continued to enhance our laboratories through acquisition of equipment both purchased and donated. This much needed equipment serves both to increase our research capabilities and to enhance our teaching efforts.

Even with the increased sponsored research activity, our public service commitment was well supported with more than \$100,000 billed to firms for special

testing and small project/consulting efforts by our faculty and staff. Numerous additional consultations were provided by the faculty on a no fee basis.

Clemson Apparel Research

Clemson Apparel Research is striving to revitalize the domestic apparel industry through proper application of advanced technology and better management techniques.

CAR is located in Pendleton, S.C., approximately eight miles from the main Clemson University campus. The most visible portion of CAR is a model apparel plant which demonstrates \$2 million state-of-the-art apparel manufacturing equipment. The plant consists of 12,000 square-foot of office space, including a 1,100 square-foot classroom, a 6,000 square-foot demonstration area and a 6,000 square-foot warehouse.

Clemson Apparel Research, open to the public since November 1988, invites visitors to tour the facility. In an average month, 200 people visit CAR, with approximately half of these people being associated with the apparel/textile industry. The remainder range between civic groups to Clemson students.

At CAR, sewing operators use equipment which has been supplied by virtually all of the machinery manufacturers serving the apparel industry, to produce short-sleeved military shirts as well as dress shirts. These shirts, made for demonstration and production purposes, must meet the strict quality requirements of the U.S. government and commercial customers. The state-of-the-art equipment is available hardware that apparel plants can order. In addition, developments from CAR research are available for inspection and sale.

As a Southeast Manufacturing Technology Center (SMTC), CAR personnel work directly with apparel manufacturers at their locations, providing assistance in quick response, flexible manufacturing, improved quality and new methods of compensating their employees. SMTC and Defense Logistics Agency seminars at Clemson Apparel Research bring participants up to date on new developments, new machinery, pay systems and results of research performed at CAR. SMTC outreach programs and services provide the basis to bring industry veterans, educators, engineers and researchers together on common ground — a place to share their expertise in solving the day-to-day problems of apparel and related textile manufacturing.

For the past four years, a major research project has focused on stitchless technologies such as adhesives and ultrasonics. These techniques have been applied to versions of the U.S. Army BDO and its accompanying butyl rubber hood. Researchers at CAR and U.S. Army Natick RD&E Labs have demonstrated the development of strong, flexible seams which offer significant improvements over their sewn counterparts.

CAR, in conjunction with the School of Textiles, Fiber and Polymer Science, offers a full range of capabilities from fabric design to garment design and manufacture to physical and chemical testing.

COLLEGE OF EDUCATION

The College of Education comprises the Department of Elementary and Secondary Education, Industrial Education, and the Army and Air Force ROTC programs, as well as the Office of Extension and Public Relations, Field Experiences, and Educational Services and Placement. Each of these administrative units achieved measurable success during the '93-94 year not only in terms of numbers

but, more importantly, in terms of quality of results. With its spring 1994 enrollment of 2,970 students, including 1,506 undergraduates and 1,464 graduates, the College of Education recorded especially strong accomplishments during the year in the three traditional academic pursuits of teaching, research and service. In particular, efforts incorporating grantsmanship, research activities, collaboration with school districts and other agencies, and outreach activities marked notable improvement when compared with the previous year. The college not only is the largest undergraduate teacher education program in the state, but its graduates score higher on mandated standardized test instruments than any other state institution. It continues to graduate more than 50 percent of the math and science teachers earning certification in the state each year. Respective summaries of accomplishment during the '93-94 academic year reflect a unified commitment by faculty, staff and administration to the college's priority on program enhancement and improvement.

Department of Elementary and Secondary Education

Instruction

The mission statement adopted by the Department of Elementary and Secondary Education includes the following: (a) prepare teachers for employment in public and/or private schools, (b) provide graduate programs for educators and personnel of community and state agencies, (c) engage in public service activities with educational entities and state and community agencies, and (d) conduct research and scholarly activities related to public and faculty interests.

During the '93-94 academic year, department faculty focused on all the areas of teacher preparation, continuing education conducted through graduate degree programs, extension courses and in-service workshops. At the same time, they achieved significant success in research and grantsmanship activities. The department currently has the largest grant on the University campus: Biocom, a \$2.3 million NSF grant to develop a new national biology curriculum. It likewise has the nation's only federally funded center for certifying former commissioned and noncommissioned military officers to become teachers in critical-needs areas. Faculty members, with improved access to network computer equipment, incorporate computer instruction into ongoing methods courses, along with higher-order thinking skills and strategies for writing-across-the-curriculum and other program initiatives.

Of special significance is the department's new Ph.D. program, which was designed to meet the career needs of future educational leaders in instruction and administration for the region and the state and which now enrolls 11 students in curriculum and instruction and nine in educational leadership.

In addition to the Ph.D. program, bachelor of arts degrees are offered in early childhood, elementary, secondary and special education. Science teaching is an additional undergraduate program granting a bachelor of science degree. Master of education degrees are available in the areas of administration and supervision, counseling and guidance services, elementary education, reading, secondary education and special education. The administration and supervision program also offers a specialist of education (Ed.S.) degree program.

As evidence that the department continues to serve a very able group of students, the undergraduates entering as the class of 1997 have an average SAT score of 1004. The strong academic potential of this entering group is strengthened by the fact that more than 90 percent passed the Education Entrance Examination during their first year at Clemson — a measurement normally administered during the sophomore year at most institutions.

With national research trends advocating increased on-site training for future teachers, the department continued its commitment to place its undergraduates in practical public classroom experiences. The first course in which education majors observe in the public schools, ED 100, had an enrollment of 453. Foundation and methods courses likewise provided frequent on-site visits for 646 students to experience the classroom environment. Field placement and increased orientation to the realities of on-site experience constituted an ongoing strength of programs in all areas of the department, both graduate and undergraduate, including both elementary and secondary programs as well as guidance and counseling and educational leadership and administration.

One academic program reflecting significant growth was special education, an area identified as one of critical need by the state. That program enrolled 54 students (undergraduate and graduate) in practica courses. The guidance and counseling program had 34 elementary and 27 secondary placements, 37 post-secondary placements, and 39 community agency placements in practica. Administration and supervision provided practica for 21 students in ED 723 for the elementary principal, 18 students in ED 724 for the secondary principal, and 25 students in ED 725, a course for superintendents.

Based on action by the Commission on Higher Education, the department was identified as a center of excellence for rural special education. As a consequence, special education majors at the senior level participated in a school-based program for the entire academic year. Another program of special focus was the "Visions for Youth" project, funded by the Kellogg Foundation to provide outreach programs aimed at the prevention of potential dropouts. In addition, the internationally recognized reading recovery program, with its regional center located at Clemson, continued to expand statewide to influence the measurable success recorded among the growing numbers of teachers and students involved.

A significant development affecting the success of the department's instructional program during the year was an ongoing project stressing school-college collaboration, which considerably strengthened both the school-based aspects of classroom instruction and the effectiveness of the practicum experience in the field. The department served as college partner on eight restructuring grants submitted by area schools.

Inservice

The Clemson campus was the site for several educational conferences and meetings. The Clemson Reading Conference attracted more than 200 teacher educators, public school teachers and school administrators from throughout the Southeast. The first Upstate Transition Conference attracted special education professionals from schools, colleges, and other agencies across the region and was uniformly rated excellent by participants.

Through the Greenville Higher Education Consortium, faculty continued to teach a growing number of courses in numerous degree programs for students in that region of the state. The department continued to meet the needs of school districts requesting critical needs and EIA courses funded by the State Department of Education. Faculty also was involved in conducting some 50 in-service sessions for school districts and related agencies and organizations.

Research, Grants and Related Activities

Faculty continued to take an active role with regard to publications. Twenty-one books, chapters or monographs were published by the faculty. Fifty articles, 35 of which were published in refereed journals, appeared in print. Thirteen unpublished articles and miscellaneous works also were submitted.

Presentations were conducted at many levels. Faculty presented at 35 national, 13 regional, 24 state and numerous local professional meetings, conferences and workshops.

Grantsmanship continued to be a special strength of the departmental faculty. More than 25 proposals were written and submitted, of which 17 were subsequently funded in excess of \$150,000 during the year. Two multi-year funded grants, the \$1 million MilCert project and the \$2.3 million Biocom project, continued their funding to meet their established objectives.

Recruitment was an area receiving special attention by faculty representatives. Teacher cadet programs continued with five high schools, a Teacher Cadet Alumni Club was established for students, and a Future Teachers' Day was held for regional public school students and their counselors.

Department of Industrial Education

The Department of Industrial Education continued to be a very dynamic unit within the College of Education during the '93-94 academic year. The department enjoyed great success in addressing its primary mission of delivering quality undergraduate and graduate instruction, while at the same time expanding its efforts in research and public service. The full-time faculty continues to carry a heavy load of teaching, reflected by the fact that of the 18 full-time faculty, all but three are totally funded from instructional funds. The three noninstructional faculty are funded from self-supporting activities centered on industrial training short courses serving the graphic arts industry, but with noted growth in services provided through the PRINTCOM Center in the area of pre-production testing on the Carint Press, the special envelope press and the newly installed Bobst corrugated press.

Teaching has been and continues to be the primary mission of the Industrial Education Department. During the report period the number of students enrolled in industrial education undergraduate programs was relatively stable while increasing strongly in the graduate areas. The interest in the master of human resource development degree has continued to be very strong, and that degree now has more than 350 persons admitted or seeking admission to the program, with more than 500 graduate students involved in departmental programs. The undergraduate enrollments in all majors have been maintained, with the bachelor of science in graphic communications degree showing great interest by students across the country and internationally.

The faculty was most active in preparation and submission of grant and research proposals. Seven faculty received grant awards during the past 12 months. The grant awards were in the areas of: trade and industrial teacher pre-service and in-service courses, tech-prep, graphics, multimedia and needs assessment. The department continues to benefit from close ties with industry liaisons as evidenced by several equipment and supply grants. The graphic communications program received new screen printing equipment, additional computer work stations for the Pre-Press Center and continues to receive financial, supply and equipment support for the graphics programs. The technology education program continues to receive industry donations of equipment and student support.

The Industrial Education Department provided various professional and community service activities during the report period. The faculty and students continue to provide leadership in various professional and pre-professional associations, are active in services to local school and community groups, and maintain active participation in industry-sponsored activities. The industrial education student organizations received national recognition during the past year. The Technology Education College Club placed first in the East Regional Manufacturing competition

and represented the East at its national meeting while the TAGA Chapter once again was recognized for excellence in student-sponsored research. Several students received national recognition (certificates and financial) for class-related projects.

Department of Military Science

During the '93-94 academic year, \$221,270 went to support a total of 44 scholarship recipients in the Army ROTC program. Twelve cadets were commissioned second lieutenants in the Army.

As members of the Fightin' Tigers Battalion, Army ROTC cadets participated in numerous activities to promote and enhance the military heritage of the University. The battalion sponsored an adventure training weekend for area high school junior ROTC programs in which more than 200 cadets from 13 area high schools participated in a variety of events, including rappelling, knot-tying, and basic life-saving techniques. In addition, the battalion invited area high schools to field teams for a military skills competition held in conjunction with the adventure training.

The department continued its oversight responsibility for four area high school junior ROTC programs. Students at West Oak, Seneca, Walhalla and Liberty high schools were provided logistical and technical support from the active Army cadre at the University. During the '93-94 school year, each program was inspected by the battalion, and all received satisfactory ratings in all inspected areas.

Numerous student organizations advised by the department continued their service-oriented projects. The Scabbard and Blade Honor Society, for instance, hosted the annual military ball, and the Pershing Rifles Drill Team members served as ushers at all home football games, garnering high praise from the Athletic Department staff.

Throughout the '93-94 academic year, cadets experienced increasingly intensified physical and technical training. The extensive leadership enhancement exercises in which they were involved, which were aimed at improving performance at the Army Summer Advanced Camp, paid off measurably, with seven scoring in the top 20 percent of all participants.

Department of Aerospace Studies

During the '93-94 academic year, approximately \$128,790 went to support 31 scholarship holders in the Air Force ROTC program. Eleven cadets were commissioned as second lieutenants in the Air Force. During the academic year cadets participated in a number of community and service activities to support and enhance the University's long-standing tradition of military heritage.

The cadet corps continued to enhance POW/MIA awareness at Clemson with a variety of activities, such as an all-night vigil at the entrance to Tillman Hall and a public candlelight ceremony at the POW/MIA memorial in Greenville's Cleveland Park. In addition, the corps cosponsored a relay run of a POW/MIA flag from the campus to the city of Columbia where it was flown over the state Capitol. The corps continued its tradition of an enhanced fitness and leadership program during the spring semester, tailored specifically for sophomores to improve their performance in field training.

During the '93-94 academic year, the cadet corps teamed with students in other military units, such as the Army ROTC on campus as well as the Arnold Air Society, a fraternal organization of selected AF/ROTC cadets and the Angel Flight/Silver Wings, a student service organization, in sponsoring and implementing a number of traditional service, social and military events. At the national conclave in

1994, cadets continued their long tradition of being one of the nation's most active and successful units through earning several awards and recognition for outstanding achievement. Selected cadets continued to participate in other military-related organizations such as the Pershing Rifles and Rangers.

Office of Field Experiences

The Office of Field Experiences during '93-94 placed a record 2,123 students at school sites throughout the region, where they observed and participated both in current and cutting-edge educational techniques and procedures as a supplement to their academic instruction in theory and research. A variety of pre-student teaching observation and participation experiences were arranged for 1,399 students. The student teaching program experienced a substantial increase for the year, with placements arranged for 393 students, while practice placements numbered 179.

Thirty-three teachers and three faculty members received training in administering the state-mandated observational instrument, the APT (Assessment of Performance in Teaching) during three-day sessions scheduled in the fall and spring semesters. A number of administrators and faculty attended sessions on the updated instrument, ADEPT, projected by the State Department of Education to replace the earlier model, and the college has agreed to serve as a pilot site for testing the new instrument. The annual survey of student teachers and supervising teachers again reflected a consistently high level of satisfaction with the supervisory processes used by the office in its program of observations and evaluations of student teachers.

Office of Extension and Public Relations

In its continuing effort to reflect Clemson's commitment to service and outreach for the public school districts, businesses and industries, and other agencies throughout South Carolina, the Office of Extension and Public Relations recorded measurable success in its '93-94 operations. During the year a total of 240 courses was offered at various sites throughout the state. Those courses provided undergraduate and graduate instruction not only in professional education but also included such academic areas as mathematical sciences, industrial education, agriculture, nursing, economics, vocational technical education, history, English, forestry and management.

The off-campus program provided 82 courses during the fall 1993 semester, 80 during spring 1994 and 78 during the two summer sessions of 1994, enrolling a total of 3,997 students for the '93-94 academic year. Those offerings included courses that constituted a regular part of the degree-program curriculum at Clemson University as well as those designed especially to meet specific needs of individual school districts and other agencies as part of the University's commitment to service and outreach. Regional centers for providing off-campus courses on a regular cycle were maintained in Greenville at the University Center on the Greenville Tech campus and in Greenwood at Piedmont Tech. The '93-94 academic year likewise saw a strengthened coordination of efforts at the University Center in Greenville between the offerings provided by the Office of Extension and those in Clemson's expanded undergraduate degree programs offered there.

In addition to providing off-campus course offerings, the office has responsibility for public relations efforts emanating from the College of Education, including ongoing publicity for academic activities such as conferences and meetings as well as individual faculty projects and endeavors. A regular publication

produced by the office is *The Clemson Educator*, a newsletter for alumni, friends and other supporters of the College of Education. In addition, the office is the editorial and publishing center for three statewide publications in teacher education: *The Teacher Education of South Carolina*, *South Carolina Classrooms* magazine, and the *SCACTE Journal*. Regular liaison activities are maintained with the University's public relations offices.

COLLEGE OF ENGINEERING

During the FY '93-94 Clemson University's College of Engineering sought to define its role in fulfilling Clemson University's vision of becoming the "leading technologically oriented land-grant university in the nation." After a year-long study and process conducted by the college's strategic planning committee, the following statements were adopted:

Mission: We provide undergraduate and graduate educational programs grounded in fundamentals which prepare graduates to apply engineering principles creatively and responsibly. We also generate, disseminate and apply engineering knowledge for the benefit of South Carolinians and the global community.

Vision: We will be a national leader in engineering education whose graduates are eagerly sought by employers throughout the country. A number of our research areas will be internationally prominent. Our partnerships with industry and government will be models for educational and technological innovation.

Guiding principles:

- Our primary role is education.
- Our students must develop the ability for self-education.
- We pursue excellence in all endeavors.
- We believe in intellectual freedom.
- We believe our scholarly endeavors — teaching, research, synthesis and application — are mutually supportive.
- We encourage and support academic, professional and personal development.
- Our conduct must be characterized by ethics, integrity and honesty.
- We value the esprit de corps, pride and loyalty that underlie the Clemson tradition.

The College of Engineering was involved with a number of other activities:

- The College of Engineering underwent a review of all engineering degree programs by the Accreditation Board for Engineering and Technology. The self-study and visitation by outside engineers and professionals are conducted every six years, and early indications are that every engineering program at Clemson will receive continued accreditation.
- A new honor code was established for all engineering students. The code, written by a group of students, emphasizes the "honest and ethical" performance of students on homework and examinations. The code establishes a new honor council which, if a student is accused of a violation of the honor code, can hold a hearing to determine the charge.

- The College of Engineering had 3,227 undergraduate and 740 graduate students enrolled as of the fall semester 1993. This year's freshman class had an SAT average score of 1,103, the highest in the college's history. During the '93-94 academic year 530 bachelor's, 181 master's and 33 doctoral degrees were awarded by the College of Engineering.
- During the FY '93-94 the college had \$22.3 million of in-force research. More than \$8.7 million was expended in research projects, and new awards of research totaled \$11.3 million.
- More than \$5.3 million was given to the College of Engineering in received donations, an increase of 30 percent over last year's giving and a new record for the college.

Academic Departments

- Dr. Richard Hegg, professor and head of the Department of Agricultural and Biological Engineering, was inducted into the Russian Academy of Agricultural Sciences as a foreign member.
- Dr. Larry Dooley was appointed head of the Department of Bioengineering. Dr. Dooley previously served as a professor of bioengineering at Clemson and as chairman of the Bioengineering Alliance of South Carolina. Also in the department, a conference on "Succeeding in Academia: Your Foundation for a Successful Career" was organized by assistant professor of bioengineering Dr. Martine LaBerge. The conference attracted nearly 150 participants from around the nation seeking to develop and strengthen their skills and techniques in securing employment in the academic world. It was sponsored by the Women in Engineering Board which is an organization of the Southeastern University and College Coalition for Engineering Education (SUCCEED).
- Dr. Gene Haertling, Bishop Distinguished Professor in the Department of Ceramic Engineering, received word that his RAINBOW High Displacement Actuators had been selected as one of the 100 most technologically significant new products of the year by *R&D Magazine*. The invention represents a new generation of ceramic piezoelectric structures which have the ability to directly convert electrical energy into motion and vice versa. NASA funded the project from which the RAINBOW actuators were invented.
- Dr. Dan Edie was named head of the Department of Chemical Engineering. He is the Dow Chemical Professor of Chemical Engineering at Clemson as well as the co-director of the Center for Advanced Engineering Fibers and their Composites.
- Research being conducted by faculty and students in the Department of Civil Engineering could help the famed Leaning Tower of Pisa from toppling. As part of an Italian commission working on the historic landmark, Dr. Tim Reinhold, a graduate student, and three seniors painstakingly recreated the City of Pisa in the form of a rigid foam model. The model then was shipped to a wind tunnel laboratory in Denmark for testing.
- Two students in the Department of Electrical and Computer Engineering received National Science Foundation fellowships. The prestigious awards will enable John Shea and Clint Wilkins to join two more current NSF fellows in pursuit of graduate degrees at Clemson University.
- Dr. Glen Daigger was named head of the Department of Environmental Systems Engineering. Dr. Daigger previously served as a senior vice president

for CH2M-HILL, a worldwide consulting engineering firm, and is a recognized expert in the area of wastewater treatment technology.

- Dr. Michael Leonard, professor and head of the Department of Industrial Engineering, received the 1994 Fellow Award from the Institute of Industrial Engineers.
- Construction continued on schedule for the 100,000-square-foot Fluor Daniel Engineering Innovation Building, which will house the entire Department of Mechanical Engineering, in addition to faculty and staff from the Department of Electrical and Computer Engineering. In addition to administrative and faculty offices, the \$18 million facility will house state-of-the-art research laboratories for Clemson engineering students.

Collegewide

- In the Office of the Dean of Engineering, Dr. Thomas M. Keinath, dean of engineering, was elected president of the International Association on Water Quality at their biennial conference held in Budapest, Hungary.
- Dr. Christian E.G. Przirembel was appointed to the position of associate dean of engineering for research and graduate studies at Clemson. Dr. Przirembel previously served as head of Clemson's Department of Mechanical Engineering and currently is senior vice president for education of the American Society of Mechanical Engineers.
- The Office of Continuing Engineering Education was involved in a multi-university program of instruction at the Charleston Naval Shipyard. Four Clemson engineering faculty provided nearly 350 total hours of instruction to help retrain and use the engineering expertise of many of the shipyard personnel to aid in the extensive environmental studies and remediation after the shipyard closes. In addition, more than 1,800 people attended CEE short courses, conferences and seminars during the past fiscal year.
- Four freshmen in the College of Engineering were among 50 students selected nationwide to receive \$12,000 scholarships from NASA. Administered through the college's Minority Engineering Program, the scholarships are awarded to minority students who possess outstanding academic credentials and a desire to pursue a career in engineering. The funding covers the student's basic cost of education, along with funding for summer stipends, mentorships and NASA-related travel.
- The Freshman Engineering Program is the gateway to the College of Engineering. At any given time, the Freshman Engineering Program serves between 900-1,250 students. Students utilize the advising and counseling services of the Freshman Engineering Program frequently. In '92-93 students came to the Freshman Engineering office 2,862 times to meet with an adviser. In '93-94 the comparable figure was 6,842. In an effort to attract more highly qualified freshmen, freshman engineering initiated a high school visitation program called Clemson Engineering — See For Yourself! This program brought the top applicants to campus for a tour of engineering facilities and provided in-depth exposure to the College of Engineering. Seventy students attended this first program by invitation only. Their evaluation of the visit was very positive, and the program will be expanded in '94-95.
- Four Clemson engineering students were among the first to participate in the Engineering Program for International Careers (EPIC). Two will have internships with BMW in Munich, Germany, one will work with Fluor Daniel, and another will work with Michelin. EPIC provides engineering

students with two years of a foreign language and an internship experience both in the U.S. and overseas, in addition to their regular course work. EPIC is a program funded by the SUCCEED coalition.

- A Teaching Effectiveness Committee was formed last year by the dean to foster improved teaching in the college. Several forums, ranging from "Does Anyone Here Really Care About Good Teaching" to an "Effective Teaching Workshop," were held during the past year for faculty to help them learn new teaching methods, better understanding of the educational process and sharing information about what works for them in the classroom.

Research Centers, Institutes and Alliances

- Through the activities of the College of Engineering's Center for Advanced Manufacturing (CAM), an outreach program to assist small and mid-sized businesses received continued funding of \$144,000 from the Southeastern Manufacturing Technology Center. The College of Engineering and CAM currently are working to develop long-term partnerships with companies and will gradually develop a more extensive outreach program. In addition, the center had more than \$3.2 million of contracts in force, with expenditures by 15 faculty in the amount of \$895,000. CAM had activities ranging from work in hazardous waste robotic material handling to rapid prototyping of products for industrial clients which have ranged from governmental agencies to industrial companies. The center also has moved aggressively to establish a technology transfer laboratory for industrial clients in the area of rapid prototyping.
- Wireless communications was the theme for the Center for Computer Communication Systems' 4th annual conference Nov. 11-12, 1993. Entitled "Personal and Wireless: The Ultimate Communication Networks," the conference gave invited industry guests an opportunity to hear presentations on the latest technology from leading experts in the field. Attendees had an opportunity to interact with the conference guest speakers, CCCS faculty and graduate student researchers, become acquainted with CCCS research and participate in a creative exchange of ideas in a number of research areas. Discussions with individual companies is ongoing and the center is confident this interaction and collaboration will be mutually beneficial and lead to the development of new technologies.
- The Bioengineering Alliance of South Carolina offered to students in bioengineering an opportunity to be hosted by clinicians in the State of South Carolina for clinical internships. This activity is very popular among graduate students. During the '93-94 year 20 bioengineering graduate students have participated in the clinical internships program of the alliance at MUSC, USC and GHS.
- The Center for Engineering Ceramic Manufacturing announced plans to build the Bishop Center at the Clemson Research Park in Pendleton, S.C. With more than \$2.6 million in private gifts and equipment pledged to the new facility, the Bishop Center will house state-of-the-art equipment for research by Clemson ceramic engineering students. In addition, the center announced a new partnership with the Tile Council of America, who will co-locate with the Bishop Center.

COLLEGE OF FOREST AND RECREATION RESOURCES

The report of FY '93-94 activities for the College of Forest and Recreation Resources' academic, research and extension programs is included under the Division of Agriculture and Natural Resources on page 105.

COLLEGE OF LIBERAL ARTS

The College of Liberal Arts is committed to the belief that a university only can achieve greatness with strong programs in the humanities, performing arts and social sciences. The college embraces the belief, as well, that a self-governing society requires of its citizens a basic and general education that will enable them, regardless of the career paths they follow, to lead full and thus useful lives and to contribute to the general welfare of society.

The faculty of the college teaches approximately one-quarter of the credit hours taken by students; and, of the 38-semester hours needed to complete the University's current "general education requirement," the college contributes nearly all of the courses for 21 of these hours.

The College of Liberal Arts consists of the departments of English, history, languages, performing arts, philosophy and religion, political science, psychology and sociology. All departments offer majors leading to the B.A. degree. English and history offer the M.A. degree; English also offers the M.A. in Professional Communication; psychology offers the M.S. in Applied Psychology and the Ph.D. in Industrial/Organizational Psychology; sociology offers the M.S. in Applied Sociology; and political science offers the M.P.A. in Greenville in conjunction with the University of South Carolina at Columbia.

More than 90 percent of the tenured and tenure-track Liberal Arts faculty hold the doctoral or other terminal degree. Graduates of the college enter some of the country's outstanding graduate and professional schools; many of the graduates pursue careers in business (including the service industries), industry and government upon earning their degrees from the University.

Faculty Highlights

Several highly respected journals emanate from the College of Liberal Arts. *The South Carolina Review* is edited by faculty members in the Department of English. This distinguished magazine, whose contributors have earned a number of awards, provides a forum for literary scholarship and criticism, as well as for outstanding poetry and short stories. *The Upstart Crow: A Shakespeare Journal*, which also is edited in the Department of English, features scholarly articles from eminent Shakespeareans on all aspects of Shakespeare: his life, the editing of his plays and poetry, dramatic and film productions of his plays and the interpretation and teaching of his work. Both *The South Carolina Review* and *The Upstart Crow* are desktop designed and published in the college's own desktop publishing laboratory in Daniel Hall. The lab is staffed by graduate assistants enrolled in the English department's M.A. in the professional communication program. Faculty in the Department of Political Science, in cooperation with their counterparts at the College of Charleston, edit *The Journal of Political Science*, which boasts a list of authors from

leading colleges and universities from this country and from overseas. This journal emphasizes the scholarly contributions of younger researchers and addresses themes that appeal to a broad range of scholars, not merely those in political science. This year's issue, for example, was devoted to "outsiders" in American politics and "collective intervention" in foreign policy. *The Journal of Sport History*, the leading journal in an emerging field of scholarship, is edited by a professor in the Department of History.

Liberal Arts faculty also continues to be extremely active in scholarly and creative endeavors. They deliver papers at numerous regional, national and international meetings and conferences; they contribute articles, essays, poetry and fiction to a variety of established and influential journals; they edit book-length collections and prepare textbooks; they are active in musical and dramatic performances; and they write books in their areas of expertise that are issued by respected publishers and that receive favorable notices in the press. In the period under review, members of the history faculty published three books, while a total of three book manuscripts were accepted for publication by members of that department. The members of the history faculty also published 23 articles and had 20 others accepted for publication. Faculty members in the Department of Languages published five books, while one of its faculty received the Order of the Palm bestowed by the French government. Faculty in political science published three books. One faculty member in that department received the U.S. Information Agency's Award for Outstanding Service for his four terms as chair of the J. William Fulbright Scholarship Board. Another completed a year of research as the recipient of a prestigious Twentieth Century Fund grant. A geography professor received a Fulbright Fellowship for study in Morocco, while a faculty member in languages received the SCOLT 1994 Outstanding Foreign Language Teaching Award: Post Secondary, which was presented by the Southern Conference on Foreign Language Teaching.

A member of the Department of History was chosen the Alumni Master Teacher for 1994.

In addition and as further acknowledgment of the recognition faculty members in the College of Liberal Arts are receiving, they often hold positions as officers and as board members of a number of professional organizations and societies. For example, a political science faculty member assumed the presidency of the S.C. Political Science Association. A sociologist continued to serve as president of the National Association of Marital and Family Therapy. A history professor served as secretary-treasurer of the History of Science Society, while another chaired the European history section of the Southern Historical Association. A performing arts faculty member was elected president-elect of the Southeastern Theatre Conference (SETC), a 10-state, 3,400-member professional organization, while another faculty member in that department was awarded a Distinguished Alumni Award — Presidential Citation by his undergraduate alma mater. Another faculty member in performing arts conducted the Clemson Symphonic Band in a prelude concert in Carnegie Hall. Faculty members also directed and performed in six plays and in 12 concerts by student ensembles, while the faculty in performing arts acted in three professional plays and performed in two professional concerts. Too, the Liberal Arts faculty serve on editorial boards in their areas, as manuscript referees for publishers and as evaluators of grant proposals.

Since one of the means by which the strength of a college research commitment can be measured is in the excellence of its students, it is especially interesting to note that a M.A. thesis written by a history graduate student was published without alteration by Oxford University Press. The book also was picked as an alternate selection of the History Book Club.

Other departmental activities include, but are not limited to, the following: a book review service originating in the Department of English that specializes in children's books; research conducted by the Department of Psychology in a variety of topics such as aging, industrial safety, stress management, computer-assisted instruction, assessment of virtual reality, artificial intelligence, consumer behavior, decision-making strategies, the development of pattern vision in children, eating disorders and substance abuse; and research conducted by faculty in the Department of Sociology in several areas, including police violence, parental grief, child abuse, children's responses to crises, alcohol consumption, abortion, homelessness and the sociology of emotions. The Speech Communication Association presented a stage adaptation of a book authored by a faculty member in Speech and Communication Studies. The C. Calhoun Lemon Lecture in Philosophy was delivered this past year by Professor Daniel C. Dennett, distinguished professor of arts and sciences at Tufts University. His topic was "Darwin's Dangerous Idea: Some Misbegotten Fears About Evolutionary Thinking."

Regular features of the College of Liberal Arts include gatherings of scholars and creative writers. The Department of English continued to host the Southern Circuit Film Series, which brought independent filmmakers to the campus to show and discuss their works. The departments of Performing Arts and English cosponsored the third annual Clemson Shakespeare Festival in March, which attracted approximately 14,000 patrons to its performances, lectures, workshops and telecourse. This week of activities, which focused on the theme of "Shakespeare's Leading Ladies: Gender and Genre Issues in the Plays," featured productions of six full-text plays by three different dramatic companies, including Actors from the London Stage. The festival also included a series of film versions and adaptations of the plays, a lecture series by five internationally known scholars on women in Shakespeare, and dozens of workshop activities which enabled actors and scholars to bring audience members of all ages to a new understanding of Shakespeare's art and a new appreciation for how his words have affected our culture. The climax of the festival was a performance by Claire Bloom in *Then Let Men Know: A Portrait of Shakespeare's Women*, her one-woman show based upon six of Shakespeare's female characters.

The departments of English and Performing Arts, along with the Committee on African-American Studies, sponsored the first Festival on African-American Literature and the Arts, featuring Harvey Gantt, Nikki Giovanni, Dori Sanders, Trudier Harris and Alice Childress, along with art exhibitions, musical performances and a special production by the Clemson Players. The festival, which will be an annual event, drew more than 5,000 in attendance at its various events.

Public Service

The public service roles played by the College of Liberal Arts throughout the state and region continue to experience significant growth. Political science faculty frequently is called upon by units of state and local government for advice in such areas as poll-taking, taxation and government organization. In addition, political scientists often serve as panelists for civic organizations and as consultants to both the print and electronic media on national and international affairs. They also provide expert testimony before congressional committees and in federal district court proceedings. Students in the master of public administration serve internships with local governments throughout the Upstate, working on such matters as correctional policy, community development and labor law compliance.

Sociologists contribute their expertise in such areas as the design and analysis of social surveys, leadership, the impact of industrial development on society, as well as in program development and evaluation in the fields of prison reform, spouse abuse, child custody, mental health, and alcohol and drug problems.

Faculty in sociology also offers workshops in staff growth and development both for private and public service agencies. Graduate students in applied sociology provide analyses of operating structures of public service agencies, community needs assessments and research in drop-out prevention. Psychologists continue to serve as consultants to the Southeastern Managers Network, an information sharing organization of senior managers representing more than 20 area businesses and industrial concerns. Psychologists also continue to provide consultation on jury selection, eyewitness validation and expert witnesses on criminal sanity. Graduate students in the applied psychology program provide a wide spectrum of services, including training, personnel selection, job analysis and labor-management relations to area industry and businesses. English faculty members conduct seminars and workshops in business and technical writing. Several faculty members in English are deeply involved in the activities of the Clemson Little Theatre. A history professor received a SCUREF grant to investigate ways to infuse concepts related to environmental restoration and waste management into relevant areas of the technical college curriculum.

The Department of Languages continues to recognize that it has a special mission in a world becoming more internationalized with each passing year. Although its study abroad programs and undergraduate internships are curricular-based activities, they nonetheless serve to represent the Clemson interest in foreign cultures. In the summer the department offered three study abroad programs: French students studied in Angers, France; German students traveled part of the time in Germany and spent the remainder of their trip living with families in the small town of Nabburg in Bavaria; Spanish students lived with families in Puebla, Mexico, where they also enrolled in Spanish classes. The Spanish students concluded their trip with a four-day visit to Mexico City. Thirty-six undergraduate majors in language and international trade studied in nine countries — France, Germany, Switzerland, Mexico, Spain, Argentina, Columbia, Costa Rica and Ecuador — as either participants in a study abroad program or on internship assignments.

Among the continued recipients of the college's public service activities are the state's schoolteachers. Improved civic education in the state's public schools is the goal of the Thurmond Seminar, an annual cooperative venture of the Department of Political Science, College of Education and the Thurmond Institute of Government and Public Affairs. Twenty social science teachers from the state's middle and senior high schools participated in the 1994 summer seminar, with classes held both in Clemson and in Washington, D.C. Liberal Arts faculty also held summer institutes on campus in European History, French and Spanish for Advanced Placement (AP) teachers.

The S.C. Rural Teacher Network is a Department of English outreach program funded by DeWitt Wallace-Reader's Digest Fund as part of a grant to the Bread Loaf School of English, Middlebury College. Teachers from rural S.C. communities receive grants of up to \$20,000 each for three years of graduate study and to participate in networked humanities/literacy projects in their schools. A faculty member in the English department who serves as publications director for the national Rural Teacher Network is funded by Bread Loaf as part of the continuing partnership between Middlebury College and the English department.

Piloted by the Bread Loaf Rural Writing Network in South Carolina, Project REACH (Rural Education Alliance for Collaborative Humanities), which is funded by a Rockefeller Foundation grant channeled through the S.C. Humanities Council, still operates out of a base in the English department. The "Learning Laboratory" for Humanities and Science Teachers, a project related to REACH and directed by a faculty member in the Department of English, received a substantial grant from the Governor's Fund for Innovative Education for '94-95.

The Bingham Trust continued to fund Clemson Writing in the Schools, which administers two programs — Writing for the Community and Performing Across Cultures. Both are national programs with sites in 20 states but with a heavy concentration in South Carolina: these are collaborative ventures between the University and public schools to improve writing, promote public service writing and publishing projects, and to foster cultural awareness.

Additional outreach activities include faculty from the performing arts department serving regularly as judges for competitions in such areas as music, theatre and forensics in the region and state. In addition, The Theatre for Young audiences troupe, sponsored by the Department of Performing Arts, puts on 20 school performances of a play written by a faculty member; these schools are located in a four-county area surrounding the University.

The College of Liberal Arts serves the entire student body in a variety of ways other than through direct classroom instruction. For example, Clemson's Model United Nations organization, sponsored by the Department of Political Science, has won numerous awards at regional and national meetings over the last two decades. In 1994 Clemson students teamed with the Japanese Model United Nations Society at the National Model United Nations Conference, at which Clemson gained honorable mention recognition. Political Science also advises Clemson's delegation to the S.C. Student Legislature. In 1993 this group won acclaim as the best large-school delegation at the annual meeting in Columbia. Aside from these activities, the Department of Political Science provides internship activities for undergraduates who wish to gain valuable experience in local, state and national government. The Department of English operates the Writing Laboratory, which is available at no charge to all students on campus with writing deficiencies.

The college also contributes to University life by supporting a number of student organizations and extracurricular activities. For example, performing arts oversees the Clemson Players, the student drama group that stages four plays during the academic year and two during summer school. Some of its productions have received regional and national recognition. Many musical activities also are under the direction of performing arts: the University Concert Series, Robert and Lillian Utsey Chamber Music Series and student organizations including Tiger Band, Symphonic Band, C.U. Chamber Orchestra, University Chorus, Chamber Singers, C.U. After Six Singers and Jazz Ensemble. The newly organized Clemson University String Quartet played several performances for civic and school groups. Also, the Clemson University Concert Band, a town and gown ensemble, was organized in 1994 and presented its first concert. The Department of English provides faculty advisers for two student publications: *The Chronicle* and *The Tiger*, the weekly student newspaper that has earned a number of collegiate awards.

Program Development

The College of Liberal Arts Advisement Center, which began operations in the summer of 1988, has as its principal activity the academic advisement of approximately 225 undergraduates enrolled as liberal arts (undeclared) majors, a category designed for students who have not yet decided on a major area of study and are in the process of exploring academic options. Students from other majors in the College of Liberal Arts, as well as from other colleges, often ask the staff of the Advisement Center for advice on any number of topics involving academic and career-related matters.

The language and international trade undergraduate major continues to represent one of the significant bridges erected by the College of Liberal Arts to span the gap between the liberal arts and the scientific and technological disciplines on campus. This major joins College of Liberal Arts with the colleges of Agricultural Sciences, Commerce and Industry, and Forest and Recreation Resources in a most

successful interdisciplinary effort. Another continuing and successful interdisciplinary endeavor, Communication Across the Curriculum, which is housed in the departments of English and Performing Arts, involves all nine academic colleges in the communal goal of improving the writing skills of students. Recognizing the emergence of a new world political order, a political science faculty member continued to teach international relations courses in Spanish and started a French track in the fall.

A new bachelor of arts degree program in speech and communication studies has proven to be quite attractive to students on campus majoring in other subjects. Without benefit of an entering class of freshmen, this new degree program boasted more than 50 majors in May. The prospect looks promising for the program to enroll more than 100 undergraduate majors in the near future. Plans are well under way to separate speech and communication studies from the performing arts department and to provide it with program status in the College of Liberal Arts. The Department of History revised its major requirements to include a senior seminar and a course in geography. Also, a minor in African-American studies was developed and is housed in the Department of History.

The Department of Psychology's M.S. degree in applied psychology with tracks both in human factors and industrial/organizational psychology has completed a very successful sixth year. Its graduates are in demand both by regional and national companies. In only its second year of operation, the M.P.A. program, offered at the University Center in Greenville through a cooperative arrangement between Clemson and the University of South Carolina at Columbia, grew to more than 40 students, many of them already employed in local government in the Greenville/Spartanburg metropolitan area.

With the renovation of Brackett Hall completed, the FY '93-94 year brought additional changes to this facility, as sociology and political science added a new state-of-the-art computer laboratory for teaching undergraduate research methods, and political science began work on a moot courtroom to be used by pre-law students.

The Robert Howell Brooks Center for the Performing Arts was dedicated on April 15-16, 1994. The dedication events included a student tribute to Leonard Bernstein, a Gala for Friends of the Brooks Center and a performance of Beethoven's Ninth Symphony. The dedication will be simulcast on S.C. ETV and Public Radio on October 5, 1994, at 8:00 p.m. A bachelor of arts program in performing arts has passed all levels of University curriculum review and awaits institutional approval for submission to the Commission on Higher Education.

In sum, the College of Liberal Arts has completed another most productive year, and it looks forward to continuing to provide creative, intellectual and artistic leadership to the University, state and nation.

COLLEGE OF NURSING

The College of Nursing offers undergraduate degree programs in nursing and in health science and a master's level graduate degree program in nursing with two focus areas, clinical specialization and family nurse practitioner.

Students completing the undergraduate nursing program are eligible to become licensed as registered nurses. Students completing the family nurse practitioner program are eligible to apply for certification by the American Nurses' Association.

The academic majors are supported by a fully equipped and staffed Learning Resource Center and a Nursing and Wellness Center which provide learning, research and practice opportunities for students and faculty.

Development

The mission of the Development Office is to attract support of constituent groups through innovative and creative programming and writing to encourage giving which focuses on college priorities. To realize this mission, the Development Office offers a variety of funding opportunities and awareness programs based on the interest and inclination of the person or group being addressed. Volunteers serve on the College of Nursing development board and provide the leadership to develop prospective donors necessary to achieve the fund-raising goals.

The development officer also serves as the liaison to college alumni. Currently, the Clemson Alumni Nursing Society consists of a core group of alumni who act as a board of directors. During the '93-94 academic year, the group met frequently, resulting in the Clemson College of Nursing alumni conference which was held October 28, 1994. The conference will be held annually. One of the aims of the conference is to generate interest in and support for the alumni society and to attract a more active membership.

The 1994 Alumni of Merit were announced at a recognition banquet on October 27, 1994. Those recognized as Alumni of Merit are selected for distinguished achievement; proficiency in practice; leadership and participating in professional organizations; contribution toward the advancement of Clemson University's College of Nursing; and writing, speaking, publishing and research.

College priorities for fund raising during the '93-94 academic year included:

- Professorships and visiting lectureships.
- Special project support.
- Equipment for Nursing Skills Laboratory, Health Science Laboratory, classrooms and Media Resource Center.
- Scholarship and assistantship support.

During FY '93-94 the College of Nursing received almost \$282,000 in cash, equipment and services from alumni and other friends compared with last year's total of \$138,000.

Department of Health Science

The Department of Health Science faculty is pleased to announce the graduation of the first class in the major Health Science. Twenty-six graduated at the May 1994 commencement. The graduates are finding jobs in health and wellness programs, as well as continuing their education in graduate programs in epidemiology, health education and pharmacy. Several students have been accepted for physical therapy and occupational therapy programs, leaving Clemson after their third year. Two tenure-track faculty joined the department this year: Dr. David Phoenix from Morehouse University in Atlanta and Dr. John Long from Lynchburg College in Virginia.

Teaching Highlights for FY '93-94 include:

- Implementation of 11 new courses, including two honors courses.
- First sequence of senior field experiences in more than 38 upstate locations.
- Growth in majors from 135 to 210 in May 1994.
- Increase in course sections from 33 to 58.
- Development of a cross-listed Health/Environmental Science course, "Public and Environmental Health."
- Five graduate students in hospital architecture enrolled in HLTH 620 Internships during the summer, initiating our opportunity for collaboration between our departments.
- University approval of an interdisciplinary program with the College of Education for a minor for Early Intervention Specialists. The program included the development of a new health course, "Health Needs of High Risk Children."

Research Highlights for FY '93-94 include:

- Dr. Cheryl Rainey is conducting a study on tobacco prevention intervention in the Pickens County schools funded through the University Research Committee. Dr. Rainey has involved health science honors students in the delivery of the health education.
- Dr. Rainey and Dr. Karen Kemper have a paper accepted for the fall 1994 national meeting of the American Public Health Association.
- Dr. Kemper has published the following research paper: "Dietary Behaviors of S.C. Adolescents" in the Journal of the S.C. Medical Association in June 1994, with Drs. Sargent and Schulken from USC.
- Drs. Debra Jackson, David Phoenix, Cheryl Rainey, Karen Kemper, Deborah Falta and Teri Heard from Health Science faculty and Brenda Thames, Emma Owens, Frank Mauldin and Jean Kuenhel have received funding from the Department of Social Services to implement the first year of a research study: "Promoting Success for African-American Youth."
- Dr. Debra Jackson has extended her NIH research grant for the fourth year to study "Variables Affecting Ostomy Patient Outcomes."

Service Highlights for FY '93-94 include:

- Dr. Cheryl Rainey has served as the chair of the Pickens County Healthy People 2000 coalition and is chair-elect of the State Area II Healthy People 2000 coalition for Greenville/Pickens counties.
- Dr. Debra Jackson is a member of the National American Cancer Society Committee on Colorectal Cancer for 1994.
- Dr. John Long is a member of the Southern Appalachian Leadership Initiative on Cancer, a community-based coalition supported by the National Cancer Institute.
- Ms. Deborah Falta has been elected to the board of the Anderson-Oconee Council on Teen Pregnancy Prevention.
- Dr. Karen Kemper co-hosts a weekly talk radio show on WCCP radio in Clemson.
- Dr. Debra Jackson writes a biweekly newspaper health column for the *Anderson Independent*.

Department of Nursing Science

During FY '93-94 there were 604 students enrolled in the Department of Nursing Science academic programs; 519 were in the basic generic program, 18 were registered nurses enrolled in the bachelor's to master's degree program and 67 were enrolled in the Master of Science program. The department graduated 147 students; 117 in the basic generic program, 12 RN's and 18 master's students. The department also continued the Nurse Externship program which was again supported by the Anderson Area Medical Center, Greenville Hospital System and St. Francis Hospital. In this program, undergraduate students participated in an extensive in-hospital summer program to enhance their clinical competence.

During the year the M.S. program was revised to include an Advanced Practice nursing option with emphasis on the Family Nurse Practitioner. Information sessions held at the University Center of Greenville and at R.C. Edwards Hall generated much student interest. More than 30 students attended each session. The department was awarded renewal of a Nurse Traineeship grant of more than \$30,788 to support graduate students enrolled full time in the master's program.

Faculty scholarly activities included presentation of scholarly papers at local and national conferences and publication of journal articles and book chapters. Support of some of these activities was made possible through the Edgar Brown faculty development funds. The department instituted an excellence in teaching award – the first Golden Apple Award, which was awarded to Ms. Rosemary Spadoni. Dr. Syble Oldaker was awarded a University Community Service Faculty Award, and Dr. Janet Timms was awarded the Anderson College Alumni Achievement Award.

Nursing and Wellness Center

The Nursing and Wellness Center is a nationally recognized academic nursing center that facilitates the mission of Clemson University by providing a vehicle for teaching, research and service. During the FY '93-94 the NWC received more than 4,000 visits from clients from the campus, community, and local business and industry. Services are delivered by a team of health professionals including a health promotion nurse, a nurse practitioner, health educators, and nursing and health science faculty and students. The NWC provided a vital site for real world experiences for both nursing and health science students. Six undergraduate courses in our college were specifically incorporated into program planning to complement both the NWC needs for service delivery and the students' need for varied experiences.

Services traditionally offered through the clinic continued to play an important role in providing health assessment, disease prevention and disease management services to the community. More than 2,000 visits were made for child and adult immunizations and vaccines, and 200 visits were made for child and adult physical exams. The NWC also continued their tradition of offering health promotion and wellness services to University faculty, staff and students. More than 600 people participated in screenings, education classes and motivational programs sponsored by the NWC. In addition, 35 students from across campus participated in student Wellness Club called EXCEL. These students, supervised by the Wellness director, participated in health fairs, screenings and a major community service program (WALKAMERICA).

In 1993 the NWC began an exciting period of re-evaluation and growth which has allowed for many opportunities to be realized.

- *The Migrant Worker Health Project:* The NWC, funded for the past three years by the Office of Migrant Health, used the mobile clinic to deliver primary and secondary disease prevention services to 100 migrant workers in the upstate.
- *The Appalachia Childhood Immunization Project (ACIP):* The NWC hosted this project under the direction of Dr. Pam Kline. The ACIP, funded through the American Nurses' Association/Foundation Rural Health Initiative, worked with local agencies to deliver immunizations to children in the upstate. Promotional items were developed to increase awareness and compliance of childhood immunization schedules.
- *The Mobile Clinic:* The mobile clinic went into the community 24 times this year. Programs using the mobile clinic included the migrant health project, the ACIP project, community cholesterol screenings, influenza vaccine clinics, work-site physicals and health fairs. Students were included in all of the mobile clinic outings.
- *NCAA Youth Camp Physicals:* The NWC delivered physical exams to 230 local 11-15-year-olds as part of their participation in a youth camp hosted at Clemson University in June. Nursing faculty and students assisted in delivering the physical exams and had an invaluable experience working with underserved youth.
- *Clemson University Employee Medical Surveillance:* The NWC teamed with Environmental Medical Resources (EMR) of Atlanta to develop and implement a model medical surveillance program to University employees. This program serves as an exciting entry for the NWC into occupational health services targeted at employees working with biological, chemical or radioactive hazards. With Clemson University as our first client, we were able to begin the process of developing OSHA compliant protocols, delivering medical services to employees and addressing special issues related to occupational health on this campus. In 1994 the NWC will begin offering medical surveillance and other occupational health services to local business and industry with special needs for providing safe workplaces for their employees. Occupational health will open up new opportunities for faculty research and student practice in areas of worker safety, occupational medicine, environmental health, adult health education, risk communication and health promotion. It is the goal of the NWC to combine health promotion and wellness services with occupational health services to provide a comprehensive health management package to local business and industry and their employees.

Department of Continuing Education

The Continuing Education in Nursing Department offers a variety of continuing education programs in the form of conferences, seminars and workshops to meet the continuing education needs of health care professionals in the community, state and nation. Programs include clinical, educational and managerial topics that provide a basis for the health care professional to remain knowledgeable and competent in their area of practice in both educational and service settings and to maintain certification in their specialty area.

The department, which is totally self supported by course registration fees, offered 11 budgeted courses with a total of 1,074 participants and four contracted

or grant courses with a total of 390 participants in FY '93-94. Total participants for all courses was 1,464 from as many as 41 states. The majority of the participants were from the Carolinas, Georgia and Tennessee.

Although the Continuing Education in Nursing Department is well known throughout the Southeastern part of the United States for its regional conferences for ambulatory surgery nurses, recovery room nurses and occupational health nurses, it is nationally recognized for its two major conferences offered for nurse anesthetists. The department maintains a respected reputation among health professionals for its high standard of quality and outstanding service. The program continues to seek ways to improve and grow through input and feedback from participants, faculty and advisers.

COLLEGE OF SCIENCES

The College of Sciences continues to make significant contributions to Clemson University in teaching, research and outreach efforts. The college teaches more than 24 percent of the University's total yearly credit hours; and more than 20 percent (totaling approximately \$19 million) of the University's external research grants and contracts are held by faculty in the college. Some exceptional outreach programs of the college are the Geology Museum (more than 6,000 visitors per year); the planetarium (more than 2,200 visitors per year); and a very successful program to attract minorities into sciences.

The College of Sciences undergraduate teaching programs include an NSF-supported program to prepare Ph.D. students in mathematics for University teaching careers; introducing virtual reality for instruction; NSF funding to provide undergraduate research experiences in chemistry; a nationally recognized program for calculator enhanced advanced placement calculus; an NSF-funded program to train computer science faculty on laboratory teaching methods; and training for graduate teaching assistants.

Innovative research projects in the College of Sciences include the joint Clemson University/Greenville Hospital System research program; world renown research related to NASA's Gamma Ray Laboratory; discovery of biodegradable synthetic chemicals similar to natural proteins found in oyster shells; joint Clemson University/S.C. State research on superconducting materials; NASA-sponsored study of the effects of winds on the ionosphere; NSF-sponsored research on global warming; development of guidelines to protect people from lead-contaminated soil; and development of replacements for ozone-depleting refrigerants.

Dr. Edward W. Page III, professor of computer sciences, became associate dean for research in the College of Sciences in August 1993.

Dr. Bobby Wixson, dean of the College of Sciences and professor of biological sciences, served on the S.C. delegation to the South-East U.S.-Japan meeting held in Osaka, Japan Oct. 2-5, 1993. Following this meeting, he participated as a member of the Clemson University delegation visiting Hiroshima University and the Hong Kong University of Science and Technology to set up future exchange programs and cooperative conferences in biotechnology and environmental pollution control.

The College of Sciences' advisory board met Feb. 25-26, 1994, and made recommendations on strategic planning and possible reorganization. They also toured the Electron Microscope Facility and the virtual reality facilities in Jordan Hall.

In April 1994 the College of Sciences formed a museums advisory board to help the college develop appropriate long-range plans for its museums and collections, assess fund-raising needs and target sources of revenue to insure their future.

Department of Biological Sciences

The challenges to modern society are many. Informed decisions regarding health-related procedures, foods, preservation of biological diversity and waste disposal require a knowledge of the biological parameters involved. We must insure that our graduates are prepared with the appropriate knowledge and skills to meet these intellectual challenges and play leadership roles in society. We must reach not only those students majoring in some aspect of biological sciences, but also those students whose only exposure to biological systems at the University level comes from their electives.

At the undergraduate level we are in the first year of a completely changed curriculum that allows both the pursuit of more in-depth studies and, at the same time, allows for more breadth in the areas explored. A redesign of the lecture/lab combinations allows the nonscience major to explore more areas within biological sciences without having to take the laboratory sections. This has become extremely important since the department has more than 500 undergraduate majors and needs to make sure the nonmajor is served well.

At the graduate level, the multicollege initiative in genetics has resulted in a current program with 18 students pursuing an M.S. or Ph.D. degree. The Department of Biological Sciences has continued its combined teaching and research efforts with the Greenwood Genetics Center and separately with the Greenville Hospital System. One of our graduate students in zoology was awarded a prize by Polaroid International for one of his photomicrographs.

Research in the department during FY '93-94 reached the \$1.7 million expenditure level. The funding sources are very broadly based, ranging between huge federal government agencies such as NIH, USDA and DOE, to state agencies and private companies. The department also was able to acquire, through a donation from AT&T, an interference microscope worth \$80,000.

The plans for the long-delayed renovation of Kinard Annex are nearing completion. When renovations are complete, the University will have an excellent building for public display of animal, plant and geological diversity. This building will serve as an educational display area for the public and, at the same time, allow the department to better house and display our collections.

Biology Program

During the '93-94 academic year approximately 5,500 students were enrolled in courses in the Biology Program. Nine lecture sections and 65 laboratory sections per week were taught each semester by faculty and graduate students from the Biology Program and the departments of Microbiology and Biological Sciences.

The 15th annual Clemson University Biology Merit Exam was conducted in April and was attended by approximately 1,500 students and teachers.

Several grants were awarded to faculty of the Biology Program during the '93-94 academic year. These included a continuation of a \$260,000 grant from NSF for laboratory course development and grants from Wadsworth Publishing and HRM Media for the development of instructional materials. A total of seven grant proposals were submitted by the faculty of which four were funded.

Scholarly activities carried on by the faculty included four published manuscripts, four nationally published laboratory manuals, a laser videodisc and two biology videotapes. Fifteen papers were presented by faculty at national and regional meetings including the annual meetings of the National Association of Biology Teachers, National Science Teachers Association, the College Board Forum and the Association for Biology Laboratory Education. One faculty member taught eight national biology advanced placement workshops. Faculty also continues to serve as reviewers for the NSF and various publishers of biology textbooks and laboratory manuals.

Department of Chemistry

The Department of Chemistry continues to gain national recognition for its efforts in both research and education. This past year about 4,500 students were taught nearly 20,000 student credit hours with a faculty that is smaller than it was in the mid-70s. In addition the department continued to increase its external research funding with more than \$3.5 million in new grants in force and \$1.5 million in research expenditures. Unfortunately, Dr. John Petersen has resigned as department head to become dean of sciences at Wayne State University. Dr. Ron Williams was interim acting department head, and Dr. Joe Kolis has assumed that position of acting department head this fall, while Dr. Ken Marcus has become associate department head. Other faculty and staff changes include the departure of Dr. Dan Bearden who was replaced by Dr. Alex Kitaygorodskiy as director of NMR facilities, and Modest Haith, who replaced Deborah Whitfield as the department head's secretary. In addition Dr. Jim Spain retired from the faculty.

The department continues to fulfill its education mission by teaching more students with less faculty than it ever has in the past. However, the highly popular cooperative laboratories and multimedia lecture demonstrations developed by Drs. Cooper and Appling have continued to spark enthusiasm among students taking chemistry. It recently has been announced that the department will host the 14th Biennial Chemical Education Conference in 1996. This is the world's premier conference of this type, and its presence at Clemson attests to the department's rapidly growing influence in chemical education.

A number of faculty received prestigious awards this year, including Dr. John Beckerle (NSF Young Investigator Award), Dr. Kolis (NSF Award for Special Creativity), Dr. Garth Spencer (Fulbright Fellowship) and Dr. Ken Marcus (CU Alumni Research Award).

The department received a large number of new research grants this year, including major grants to Drs. Ya Ping Sun and Graham Jones. The research infrastructure of the department continues to expand at a rapid rate with the acquisition of several major new pieces of equipment, including another new mass spectrometer and new Raman and IR spectrometers. The department also took delivery of a new state-of-the-art X-ray diffractometer, which gives Clemson a small molecule X-ray facility which may be the best on the East coast.

To take advantage of the exciting developments which have taken place in chemistry recently, the department presented a strategic plan to the administration to place it in the top 50 in the United States during the next five to eight years. We will try to hire an internationally recognized chemist as department head as well as a number of additional research-active faculty. This will continue to expand our research base and increase the amount of external funds generated by the department.

Department of Computer Science

Dr. Stephen T. Hedetniemi has been selected head of the Department of Computer Science after serving two years as acting head. Bobby G. Wixson, dean of the College of Sciences, stated that Dr. Hedetniemi has proven his leadership and administrative abilities and is an excellent choice to direct the department in its future role in instruction, research and service.

Professors Wayne Madison and Harold Grossman have completed their 11th consecutive year of funding from DOD/ONR for research and development of TECNET, a national test and evaluation computer network designed and developed at Clemson by Professors Grossman, Madison, Page and their graduate students. The total amount of funding to date exceeds \$5 million.

Professor Jack Peck, with Professor Chris Jarvis in the Department of Textiles, have completed their seventh year of funding for the Clemson Apparel Research Center from the Defense Logistics Agency, bringing their total during this period to more than \$10 million. The Clemson Apparel Research facility continues to be one of the finest demonstration facilities in the country for state-of-the-art apparel manufacturing. Dr. Peck recently was awarded another \$1.5 million from the U.S. Air Force in a joint award with a faculty member at Georgia Tech to study distributed manufacturing with a company based in Alabama.

Professor Robert Geist was instrumental in establishing, together with Professor Larry Dooley in biomedical engineering, Clemson's first Virtual Reality Research Laboratory. Using a combination of Clemson University research innovation funds and a grant from Silicon Graphics Inc., Clemson University recently has purchased state-of-the-art virtual reality equipment valued at approximately \$500,000.

Professor Mary Jean Harrold is a current recipient of an NSF National Young Investigator Award, which funds \$25,000 for four years. In addition, up to \$37,500 will be matched if outside sponsors contribute to Dr. Harrold's research. During this year a total of \$17,500 was received from a SUN Microsystems equipment donation, funds designated from a du Pont donation, and Data General. She recently received a \$25,000 donation from the Microsoft Corp. Together, this will bring the total to \$37,500 which will be matched with another \$37,500 from NSF.

Professor Joe Turner is completing his second year as treasurer of the Association for Computing Machinery which is the largest and oldest educational and scientific professional computing society. Dr. Turner also completed his second, and last year as president of the Computing Sciences Accreditation Board which is the only government-recognized accrediting agency for undergraduate programs in computer science.

The Department of Computer Science is one of a consortium of six departments that recently was awarded a \$600,000 multiyear grant from NASA. There were five such awards given nationally. This grant is to be used to develop a multidisciplinary program in design and analysis methodologies in engineering. The seven members of the team come from (alphabetically) the computer science, electrical and computer engineering, industrial engineering, mathematical sciences, mechanical engineering and psychology will work with industrial partners Lockheed-Atlanta and Martin Marietta to develop curricula in the individual departments that emphasize multidisciplinary teams. A significant portion of the grant is in undergraduate fellowship funds. Professor Steve Stevenson is the participant from Computer Science; Oliver Heim will be his research assistant. Computer science will work closely with Industrial Engineering and Psychology to develop computer tools for cooperative work on the computer.

Department of Earth Sciences

Some of the highlights of the '93-94 academic year include the following:

- Six students graduated with M.S. degrees in hydrogeology. This was the first full graduating class from our recently initiated master's program.
- The number of undergraduate geology majors increased yet again and is now approximately triple what it was just five years ago. Geology B.S./B.A. graduation rates have increased to their highest level in eight years.
- Enrollments in many upper-level geology classes (mineralogy, optical mineralogy, petrology, structural geology, invertebrate paleontology, environmental geology) were the largest in several decades. Constraints on laboratory teaching space may necessitate multiple lab sections for some of these courses in future.
- Dr. Villard S. Griffin, Jr. retired on June 30, 1994, after 30 years of service to Clemson University. This brings to four the number of geology faculty who has retired in the last two years. Although temporary faculty have been hired, there have been no permanent, tenure-track positions filled during this period. The geology faculty met with members of the Earth Sciences Advisory Committee to prepare a program development plan for the replacement of retired faculty in such a way as to enhance both the undergraduate and graduate programs. The following areas of expertise were identified as critical for new faculty hires: (1) hydrogeology; (2) sedimentology – stratigraphy; (3) structural geology – geophysics; and (4) aqueous geochemistry.
- Expenditures for externally funded projects were \$563,143.18. The amount of indirect cost generated by the Earth Sciences Department was \$117,642.21. Major funded research projects include three SCUREF contracts: "Establishment of a Field Geohydrology Experimental Site" (David Snipes, PI); "Hydraulic Properties of Aquifers" (David Snipes, PI); and "Development of Remediation Alternatives for Subsurface DNAPLs" (Ronald Falta, PI). Also, Richard Warner received an NSF grant award to study the "Magnetic Petrology of the Lower Crust." Two partnership grants were funded by the S.C. Commission on Higher Education: "Full Circle Partnerships for Elementary Science Education" (John Wagner, PI) and "SCMAPS Enhancement: A Statewide Field Course for Teachers" (John Wagner, PI).
- Among noteworthy individual accomplishments, John Wagner was chosen to be the recipient of the annual award of the Environmental Education Association of South Carolina. Ronald Falta published three papers in scientific journals and three more in scientific conference proceedings and was author or co-author on seven presentations given at scientific meetings. Nicholas Kidd received an award from Sigma Xi for Outstanding Undergraduate Research for his research presentation "Mafic Mineral Crystallization in S.C. Diabase Dikes," which was given at the 1994 annual meeting of the S.C. Academy of Science in Aiken, April 1994. Graduate students Scott Brame and April James presented talks at the ER '93 Environmental Remediation Conference in Augusta, Georgia, October 1993, and April James also spoke at the 1993 annual meeting of the American Institute of Chemical Engineers in St. Louis, Missouri, November 1993. Graduate student Dave Kroening and research associate Rex Hodges presented talks at the Southeastern Section Geological Society of America 1994 annual meeting in Blacksburg, Virginia, April 1994.

- The second annual "Clemson University Hydrogeology Symposium," chaired by David Snipes, Sally Benson, Ronald Falta and Van Price, was held on September 10, 1993. Eighty-five scientists attended this meeting, and 36 professionals received eight hours continuing education credit by the S.C. State Board of Registration for Geologists.

Electron Microscope Facility

The Electron Microscope Facility has continued to grow over the past year with the addition of two new microscopes, a complete X-ray imaging package and a silicon graphics workstation. JEOL USA placed a low vacuum scanning electron microscope in the facility in order to use it as a demo lab. The JEOL 5400 is an excellent microscope for teaching as well as industrial use. Thanks to a grant awarded to the College of Engineering, a scanning tunneling/atomic force microscope was purchased for the facility that allows students and industry to observe biological as well as nonbiological samples at the atomic level. Also purchased with a grant awarded to the College of Engineering were two light-element X-ray detectors for existing transmission and scanning electron microscopes in the lab. Included with the detectors is an imaging package run by SUN workstations all networked through ethernet. The facility also is the home to one of the virtual reality/silicon graphics workstations on campus, purchased through a University innovation grant. Many exciting things are happening in the lab. Research, education and industry all have benefited from the continued support of the facility.

Greenville Hospital System/Clemson University Biomedical Cooperative

The GHS/CU Biomedical Cooperative has established a number of new initiatives in collaboration with faculty from the colleges of Science, Engineering, Nursing and Agricultural Sciences. During FY '93-94, the following activities and collaborative programs were initiated:

Research Related Activities:

- The cooperative was awarded \$545,000 by the Greenville Hospital System to support biomedical research efforts between Clemson faculty and GHS staff.
- A significant portion of these funds was used to sponsor small pilot research grant awards by faculty of the College of Sciences.
- Funded a number of postdoctoral and graduate students in the College of Sciences and in the College of Engineering.
- Two new faculty were recruited in the areas of reproductive biology and infectious diseases: (Michael Kilgore, University of Texas, Dallas, and Christian Stadlander, University of Alabama, Birmingham).
- Recruited Dr. Burt Lee, a renowned clinician at the Sloan Kettering Institute for Cancer Research and President Bush's personal physician and chief of medical affairs; Dr. Lee currently is the director of the GHS Cancer Center and an active member of our GHS/CU Cancer Research Program.
- Received approval of the "GHS/CU Biomedical Professor" by the Faculty Senate to identify clinical scientists engaged in research efforts at Clemson.
- Initiated/planned clinical trials on: 1) evaluation of slow drug release formulation of AZT in AIDS patients, Virex Inc., Denver; 2) evaluation of new

estrogen inhibiting compounds for use in treating breast cancer, Ciba-Geigy Ltd., Basel, Switzerland; 3) evaluation of an oral vaccine for the prevention of ulcerative gastritis (spring 1995), OraVax Inc., Cambridge, MA.

Courses/Lectures/Seminars:

- Continued support for the Distinguished Biomedical Lecture Series, which brought in a number of outstanding lecturers including Dr. Robert Good, recently nominated for a Nobel Prize.
- Cosponsored an international program in orthopedic surgery, "Quality Control and Outcome in Orthopedic Surgery"; Dr. Maurice E. Muller, a pioneer in orthopedic surgery and founder of the Muller Foundation in Berne, Switzerland, was the keynote speaker.
- Cosponsored the Seventh International Conference on Antiviral Research held in Charleston, S.C.
- Established the following graduate courses: Special Problems in Microbiology, "Overview of Epidemiology and Biometry"; Techniques of Clinical Microbiology and Immunology; Biomedical Seminar Series; Biotechnology and Medicine; Concepts in Mammalian Assisted Reproductive Technology.
- A number of faculty were invited to make presentations at international meetings on the research efforts done as a result of cooperative support.

Research Ties and Outreach Links — the following were established:

- Breast Cancer Research Program, with the collaboration of Clemson faculty and clinicians in the Greenville Hospital Cancer Center.
- Pediatric Infectious Disease Program, with the collaboration of Clemson faculty and the S.C. Pediatric AIDS Cooperative.
- Cooperative agreement with the Hollings Oncology Center, Charleston, to enhance cancer research and education efforts.
- Cooperative biomedical research agreement with MUSC through the joint award of an NIH EPSCOR grant, "Enhancement in Health-Related Research in South Carolina."
- Cooperative research agreement with the USC School of Medicine through a joint grant with OraVax Inc. to support research programs in the areas of mucosal immunity.

Other Outreach Activities:

- Received funding through the Greenville Hospital System to support the rural health initiative proposed by the GHS/CU Cooperative, ETSU School of Medicine and USC School of Medicine.
- Implemented a computerized network to enable GHS/CU faculty and staff to more effectively work together.
- Organized several research retreats for GHS clinicians and Clemson faculty and established monthly research conferences to discuss ongoing collaborative research efforts.
- Worked with the Greenville Chamber of Commerce and the mayor of Greenville to actively recruit biotechnology companies interested in relocating to the Clemson area.

Department of Mathematical Sciences

The Department of Mathematical Sciences continues to strive for excellence and innovation in teaching, research and service to Clemson University, the state and the nation. In teaching, the department accounted for 8.4 percent of the total credit hour production of the University. The department awarded 30 bachelor's degrees, 25 master's degrees and 12 Ph.D. degrees during this 12-month period.

Our faculty had 53 research publications supported by 35 grants and contracts with a total award value of more than \$1.5 million dollars. Funding sources included the Air Force Office of Scientific Research, Defense Logistics Agency, Department of Education, Greenville Hospital System, Grumman Corp., Idaho National Engineering Laboratory, Lawrence Livermore Laboratory, NASA, National Institute of Standards and Technology, National Security Agency, NSF, N.C. Supercomputing Center, Oak Ridge National Laboratory, Office of Naval Research, Pittsburgh Supercomputing Center, Pratt and Whitney, S.C. Commission on Higher Education and S.C. Universities Research and Education Foundation. This research focuses both on theoretical and applied aspects of the mathematical sciences and includes cooperative efforts with industry and government laboratories.

The Center for Excellence in Mathematics and Science Education continues to provide resources and training to enhance secondary education in South Carolina, and the department continues to develop undergraduate classroom innovations that are receiving nationwide attention. The TICAP Project (Technology Intensive Calculus for Advanced Placement), hosted by Clemson, has been funded by a \$1 million NSF award. The College Board has noted that the forthcoming graphing calculator requirement on the AP calculus exam could not have been imposed without TICAP providing a national base of teacher professional development in technology-based mathematics instruction.

After a national search, Robert E. Fennell accepted the department head responsibilities on July 1. Dr. Fennell assumes leadership of one of the largest departments on the Clemson campus, a department which is recognized throughout the country for the quality of its faculty's research efforts and for its truly interdisciplinary educational programs. A major strength of the department is the diversity of its curriculum which includes traditional areas of mathematics as well as statistics, operations research and computation. Dr. Fennell looks forward to maintaining this tradition and providing an educational setting in which Clemson students can learn those mathematical and computational skills necessary to compete in a technological society.

In contrast to many departments across the nation, the department continues to be very successful in attracting native U.S. citizens to its programs (28 of 32 entering graduate students representing 14 states). Our graduates find jobs both in industry and academia. Our faculty is active in University committees and serve as editors and advisers for several national journals.

Especially in these times of diminishing financial support for higher education, the faculty of the mathematical sciences department is proud of its accomplishments and maintenance of the high standards set during the past several years.

Medical Technology Program

The Medical Technology Program completed yet another productive year of teaching, advising, administrative activity and club sponsorship. The program currently enrolls about 40 students. Four students currently are doing their senior

clinical year at our hospital affiliates, completing baccalaureate degree requirements for graduation. Four students have graduated in the last academic year. The senior clinical-year students continue to excel on the national certification exam. All have been successful in finding employment in the profession. With the current severe nationwide shortages in the profession, the number and range of professional opportunities are large and starting salaries can start as high as \$32,000/year.

Competition for the limited number of clinical year positions has become more noticeable. The medical technology profession currently is seen as offering a very marketable B.S. degree. Those students who fail to secure places in the available clinical year programs commonly change to the microbiology curriculum at the end of their junior year. They are able to complete those additional requirements during the senior year and graduate on schedule. Some of these students successfully reapply for clinical year programs if their interest remains keen.

Senior-year clinical courses are offered by hospital program affiliates. Formal affiliation programs are with the schools of medical technology at the Anderson Area Medical Center and at the McLeod Regional Medical Center in Florence. Informal affiliations exist with the medical technology programs at the Medical University of South Carolina in Charleston and the Baptist Medical Center in Columbia. The Anderson program continues to help teach the introductory medical technology course taken by new majors.

The current program coordinator promotes medical technology by group and individual presentations to in-state and out-of-state students. The student medical technology club completed another successful year of activities which included presentations by speakers and service projects. Because of dwindling funds and more stringent membership numbers requirements, the club will not be funded for the coming year and its activities are expected to taper off.

Department of Microbiology

The department has continued to strengthen its teaching programs both at the undergraduate and graduate levels. Microbiology has graduated an average of seven undergraduate majors per faculty member per year (the highest in the College of Sciences). Enrollment at the graduate level also is high. There are 31 M.S. students and 22 Ph.D. students — giving a ratio of 5.9 graduate students per faculty member. At least part of this can be attributed to the fact that majors have had no difficulty finding employment — even in the current recession. The close interaction of the department with the Greenville Hospital/Clemson University Cooperative also has played a role in increasing our ability to attract high quality graduate students and to expand the graduate course offerings. Two new courses were approved for Clemson students and hospital residents: Micro 808 — “Biotechnology in Medicine” and Micro 805 “Techniques in Clinical and Medical Microbiology.” A weekly seminar series “Biomedical Microbiology” (Micro 807) was initiated. A special topics course (Micro 804) “Epidemiology in Medicine” was offered. All of these have provided opportunities for graduate students to interact closely with hospital faculty and residents.

Two new research projects were instituted involving hospital collaboration as a result of small grant awards made by the cooperative to faculty in the Department of Microbiology: Paynter (John Weems, M.D. collaborator) and Larcom (Martin Crane, Ph.D. collaborator). Research on an oral vaccine for gastric ulcers continued to be funded by OraVax. Principal investigators on this project are Lawson, Stutzenberger and Gangemi. Two new faculty members joined the department to assist in these research efforts (Christian Statlander, Ph.D., assistant professor and Janie Sigmon, Ph.D., research associate/assistant professor). Dr. John Weems,

M.D., of the Department of Internal Medicine, GHS, joined the department as adjunct associate professor.

Professor Stutzenberger was awarded a SCUREF grant of \$166,852 jointly with Professor Jenkins (Animal, Dairy and Veterinary Science) to develop courses which would encourage minority students to prepare for careers in science. Research grant awards were obtained by Dr. Lawson for studies on immunomodulation (DaVinci Laboratories) and by Dr. Kline for studies on bioremediation (Navy and MSL, Inc.) and the development of diagnostic and therapeutic products (Molecular Rx and MSL Inc.).

Four of the faculty (Barefoot, Hayasaka, Hughes and Paynter) are involved in the interdisciplinary Clemson University Food Safety through Biotechnology Program which provides funds from the S.C. Agricultural Experiment Station for graduate student stipends, research supplies and travel. Dr. Barefoot served as chair of the biotechnology division of the Institute of Food Technologists, an international professional organization and was elected chair of the regional committee to develop a food safety project.

Dr. Thomas Hughes was promoted to the rank of professor in recognition of excellence both in teaching and research. Dr. Hughes maintains a research program in physiology and genetics and has a joint appointment in the Department of Agronomy.

Enrollment of minority students in the microbiology B.S. program has increased dramatically during the past two years. In addition, courses taught by the Microbiology Department continue to serve numerous majors both in the basic and applied sciences.

Members of the department have served on the review grant panels for NIH, FDA, EPA and USDA.

Department of Physics and Astronomy

Clemson physicists continue to receive state awards. This year it was Professor Donald Clayton who received the 1994 S.C. Governor's Award for Excellence in Science from Gov. Carroll A. Campbell Jr. Clayton is a co-investigator of the OSSE Experiment on the Gamma Ray Observatory satellite. He and other members of the astrophysics group are active in the analysis of data from that instrument. They use the measured gamma rays emerging from stars to infer the internal dynamics of stars, neutron stars, and black holes. His scholarly activities include fundamental theoretical studies of the origins of matter in the universe. He was a recent recipient of a \$180,000 grant from the Keck Foundation for the study of the origins of natural radioactivity in matter.

Since Professor Raymond Turner received the 1992 S.C. Professor of the Year Award, this makes two times in three years that members of the department's faculty have won one of the state's two top awards for teaching and research. Both of these faculty are heavily involved with teaching undergraduate students, including those with majors other than physics. Clayton has taught the introductory astronomy courses and currently teaches a section of the introductory physics course for engineering students. Professor Turner also teaches students in a number of the introductory physics courses.

This year was the 75th anniversary of the founding of the American Geophysical Union. The occasion was celebrated with a special series of six talks honoring James Van Allen on his 80th birthday. Professor Miguel Larsen was invited to give one of the six talks on the frontiers of near-space physics. Larsen and other members of the atmospheric physics group, Professors Carl Ulbrich, John Meriwether and David Hysell are in the process of building an observatory at

Clemson designed to monitor atmospheric dynamics, turbulence, precipitation process and aerosol pollutants. This project has attracted \$387,000 in NSF and Air Force funding and will join a handful of observatories in the world with comparable capabilities.

Rocket payloads designed and built at Clemson were successfully flown in Alaska. They now will be used in a major rocket campaign in Brazil. The campaign is NASA's major international effort this year and has received attention at the highest levels with Vice President Al Gore participating in the Memorandum of Understanding under which the campaign will operate.

Retirement has unfortunately been increasingly attractive to our senior faculty. This year it was Max Sherrill who retired after 27 years of service at Clemson. Professor Sherrill organized and administered our Ph.D. qualifier exams, taught the advanced undergraduate laboratory sequence for our undergraduate majors, and taught introductory physics and meteorology. His retirement creates a vacuum at all levels of our curriculum. His retirement followed three retirements last year and six within a few years before that.

Fortunately, we were able to add three new faculty in a very tight budget year, which required considerable understanding of our plight by the upper administration. Murray Daw is a theorist in condensed matter physics who joins us from the Sandia National Laboratory. David Hysell joins us from Cornell University and will be doing experimental research in atmospheric physics. John McCarten joins us from UCLA. He is setting up a laboratory in experimental condensed matter physics. All three are taking active roles in graduate and undergraduate teaching. Dave Hysell will be teaching one of the sections of introductory physics for engineering students.

The department received \$1,355,665 from federal agencies for research carried out during the '93-94 academic year. This came to \$79,745 per tenure-track faculty member and is the highest level to date. It is the fourth consecutive year that the average annual funding exceeded the average faculty salary. Despite that heavy research load, the average cost per student credit hour for Physics and Astronomy was, according to institutional research, the lowest for any Ph.D.-granting department in the University and lower than all but five departments of the entire University. Our cost per student credit hour was less than 20 percent of the highest cost for a department in the University and was 56 percent of the University average. We are confident that, as the University attempts to make budget adjustments to improve cost effectiveness, it will take into account the steps already taken by the Department of Physics and Astronomy and that some reasonable balance will be established among departmental budgets in the University.

Despite these times of low budget, our majors appear to be doing well. The quality and productivity of our research programs are in excellent shape. Faculty and students collaborated on 74 scholarly publications. Degrees granted this year include six Ph.D., six M.S. and nine B.S./B.A. degrees.

DIVISION OF AGRICULTURE AND NATURAL RESOURCES

The Clemson University board of trustees set a demanding new course for the Division of Agriculture and Natural Resources as the division was merged with the University's Office of the Vice President for Research. This combination of respon-

sibilities, which took place on July 1, 1994, ensures that the PSA budget will continue to be represented at the vice presidential level.

In November 1993 the University Outreach Program was established, based on the model of the Cooperative Extension Service. The dean and director of Cooperative Extension was named to head the University Outreach Program.

The Musser Fruit Farm, located at Oconee Point was officially dedicated in the spring of 1994. This state of the art facility will be used for research, extension and teaching activities related to a wide range of fruit and environmental topics.

The strategic plan for the College of Agricultural Sciences was completed and work began on implementation plans in three strategic areas. Issues included undergraduate education, sustainable agricultural enterprises, the environment, food quality and safety, families, communities and community development, and the organization and management of the college.

COLLEGE OF AGRICULTURAL SCIENCES

Academic Affairs

The academic mission of the college is to provide formal and informal educational opportunities for individuals at the undergraduate and graduate levels of study and to produce the expertise and leadership needed for further advancement and success of the agricultural industry. The college currently offers 11 undergraduate degree granting programs focusing on agricultural and applied economics with an option in community and rural development; agricultural education; agricultural mechanization and business; agronomy; animal, dairy and poultry sciences (animal industries); aquaculture, fisheries and wildlife biology; entomology; food science with a minor in nutrition; horticulture with an option in turfgrass science; packaging science; and plant pathology. Graduate programs offered by the college include a focus on discipline and interdisciplinary orientations at the master's (M.S., M.Ag., M.Ag.Ed.) and doctoral (Ph.D.) levels. Graduate studies are available in agriculture; applied economics; agricultural education; agronomy; animal and food industries; animal physiology; aquaculture, fisheries and wildlife biology; entomology; environmental toxicology; food technology; genetics; horticulture; nutrition; plant pathology and plant physiology.

Enrollment in the college continues to increase, reaching a 10-year high of 1,198. This represents an overall increase of 5 percent when compared with last year. The undergraduate programs in animal science; aquaculture, fisheries and wildlife biology; horticulture and packaging science continue to benefit from student interest, which is reflected in their number of majors with 190, 166, 104 and 81 respectively. Graduate programs in agricultural and applied economics (47 students) and environmental toxicology (50 students) demonstrate the highest enrollments. Experimental statistics courses both at the undergraduate and graduate level continue to show the highest demand.

Placement activities continue to be enhanced through the efforts of the placement coordinator in the college. The number of companies contacted with interest in agriculture majors has more than doubled. Students are being offered excellent positions with salaries approaching \$40,000. The fourth annual Agricultural Career Fair sponsored by the college during the fall will involve more than 30 companies.

The college has an active student chapter of MANRRS (Minorities in Agriculture, Natural Resources and Related Sciences). This national organization provides a framework for the academic, professional and social development of minority students.

Dr. Duane Acker, president emeritus of Kansas State University and former assistant secretary of agriculture, was invited to campus as the college's visiting master teacher. He was involved in eight separate courses ranging from animal science to agricultural economics, along with making presentations to undergraduate student organizations.

The 1993 Governor's Professor of the Year was awarded to Professor Mary Haque, who teaches landscape design in the Department of Horticulture. She has been recognized for her teaching excellence at the national level through the national Horticulture Society. She incorporates computer technologies along with significant involvement of her students in community activities.

The Class of '39 Award for Excellence was given to Dr. Ashby 'Budd' Bodine, professor of Animal, Dairy and Veterinary Sciences. He is an excellent teacher and researcher in the area of animal physiology using unique research models, i.e. sharks and skates. He has devoted a significant amount of time to students from the Governor's School for Science and Mathematics. He has shared his research efforts on state and national levels, i.e. ETV, Discovery Channel, Nova, CNN News and Good Morning America.

Professional development travel grants now are being awarded by the academic dean to faculty who are recognized by their peers and/or students for excellence in teaching.

An Undergraduate Mentor Program is being established for entering freshmen who demonstrate excellent academic potential and interest in an agriculture career. These students are provided a grant-in-aid along with an opportunity to work with faculty in their teaching and research laboratories.

The college has developed and is implementing a strategic plan in agriculture, which involves teaching, research and extension. The areas of focus include undergraduate and graduate education; sustainable agricultural enterprises; environment; food quality and safety; families, communities and rural development; and organization and management.

Cooperative efforts with the technical colleges in South Carolina, which offer degrees in agriculture, have been under way for several years. Recent efforts have included joint recruiting brochures, enhancement of student transfers following completion of the two-year degree program, and a distance degree program in Turfgrass Science offered through the Horticulture Department.

The second annual Agriculture Alumni TigerAg Tailgate will be held Saturday, October 1, 1994, prior to the Clemson-Maryland football game. Last year's event attracted more than 700 alumni, family and friends. The executive director of the agriculture alumni organization is Dr. Thomas Skelton, professor and head of Entomology.

Academic Departments

Agricultural and Applied Economics

Dr. Daniel B. Smith was appointed department head following Dr. Garnett Bradford's resignation from this position. Dr. Bradford is continuing as a faculty member in the department. The graduate program continues to attract more students than their resources can manage. Their current enrollment is 47 graduate students. The department is actively involved in foreign student exchange programs espe-

cially with France, England and Scotland. The undergraduate program has grown to 66 students, and placement of their students following graduation is excellent.

Agricultural and Biological Engineering

The department has made a significant effort to increase its enrollment at the undergraduate level. As of last spring, there were 65 majors in agricultural engineering and 31 majors in agricultural mechanization and business. The enrollment in agricultural engineering has almost doubled in three years. The graduate program has 15 students. Job placement has been relatively strong for their graduates.

Agricultural Education

Dr. Lloyd Blanton was appointed acting department head following the resignation of Dr. Glen Shinn who accepted a similar position at another institution. The program has 41 undergraduate majors on campus with another 16 part-time students. The graduate program has 19 actively enrolled students and 26 part-time students pursuing the M.Ag.Ed. degree. The faculty has sought to expand the educational opportunities for their undergraduates by providing options in agricultural communications and information systems; extension and agricultural agencies; and an emphasis in general science. The department has been directly involved in "Agriculture in the Classroom" program which is a national project. Last year, five workshops were held for high school teachers to enhance their knowledge and appreciation for agriculture.

Agronomy and Soils

The undergraduate program is represented by 29 majors and the graduate program by 18 students. Graduates of these programs have experienced diverse career opportunities especially at the B.S. level. For example, graduates have entered law school with an emphasis on environmental law, accepted positions in forensic analysis, bioremediation of soil, seed companies, industrial biotechnology, agrichemical companies and farm managers. The faculty participates in a variety of interdisciplinary and multidisciplinary courses. Recent changes in course material have included case studies, economic and environmental consequences of agricultural technology and computer-assisted instruction.

Animal, Dairy and Veterinary Sciences

The undergraduate enrollment in this program is the largest in the college. Last fall there were 182 students, and this semester 220 students are enrolled. During the past six years the enrollment has increased by 255 percent with 80 percent of the majors coming from South Carolina. The undergraduate program offers options in pre-vet and science; business and production; and meat and dairy foods. The department has a very active Dairy Science Club, Pre-Vet Club, Rodeo Club and Block and Bridle Club. Dr. Carl Thompson received the Community Service Faculty Award. Dr. Dee Cross received the Provost's Award for Scholarly Achievement. Dr. 'Budd' Bodine received the Class of '39 Faculty Award for Excellence. Dr. Elaine Richardson received the Gamma Sigma Delta Outstanding Teaching Award.

Aquaculture, Fisheries and Wildlife

Students show a high level of interest in this major and as a result, it has the second largest number of majors. Enrollment in the 1993 fall semester was 140 undergraduates, and this semester 158 students have enrolled. The curriculum emphasizes field experiences throughout the East Coast from Maryland to Florida.

Entomology

The undergraduate and graduate programs have an enrollment of 39 majors with the majority at the graduate level. Graduates find excellent opportunities to pursue their career interest either in industry or academia. Students who are majoring in other disciplines find entomology courses very beneficial in supporting their career interest. Last year, more than 200 nonmajors enrolled in at least one entomology course. The department has developed a newsletter to encourage alumni to become more involved in their programs. Through the initiatives of Dr. Joe Culin, the department is getting involved in virtual reality systems which interacts with other colleges. Dr. John Morse taught a course in China on environmental monitoring using aquatic invertebrates.

Environmental Toxicology

The graduate program in environmental toxicology was established in January 1992. In two years, 53 graduate students have enrolled in the program. In addition to the traditional course work and research projects, students are encouraged to seek out internships through various governmental agencies and corporations, i.e., EPA, Geological Survey, TVA and CIBA Corp. A unique part of the graduate program is the integration of quality assurance/quality control standards as federally mandated for toxicology work. The department initiated a cooperative agreement with Moscow State University to encourage exchange of graduate students and faculty.

Experimental Statistics

The sole mission of this department is to offer courses in applied statistics at the undergraduate and graduate levels along with statistical research support. There are no majors. The student credit hours generated has increased 30 percent when compared with the previous year. Student demand for courses is coming from the colleges of Agricultural Sciences, Engineering, Science, Education and Liberal Arts. The cost per credit hour has been reduced two-and-one-half fold during the past six years. The faculty has offered a graduate level statistical methods course four times through telecampus (distance education), reaching more than 125 graduate students off campus.

Food Science

The academic programs in this department include food science, packaging science, nutrition and food technology. The largest number of majors is associated with the packaging science program with 75 students. Courses offered by this department attracted more than 1,500 students from throughout the University. Highest enrollment is observed in the basic nutrition courses. The cost per student credit hour is the lowest in the college at \$93. Career opportunities are excellent for graduates. At the present time, industry is paying more for packaging science majors than graduates from other majors in agriculture with salaries approaching \$40,000. Dr. Elizabeth Kunkel has made a special effort to enhance the high school teacher's knowledge base of nutrition through a formal course designed for teachers and is developing special laboratory projects for high school courses.

Horticulture

The department has been very active in developing recruiting brochures to enhance the understanding of horticulture and its career opportunities. As a result, this program has 98 students enrolled, which includes the option in turfgrass. This latter program is being offered as a distance degree program in conjunction with Horry-Georgetown Technical College. Students can obtain their associate degree in golf course management and immediately begin their pursuit of a bachelor's degree without moving from the area. Clemson University brings the academic program to

them. Faculty has incorporated various innovations in courses such as involving students in community activities, interacting with professionals and clients, developing and implementing projects beneficial for geriatric facilities, nursing homes and handicapped individuals. Programs emphasize the importance of internships and volunteer work.

Plant Pathology and Physiology

The focus of this academic program is at the graduate level with a current enrollment of 28 students. Courses are directed not only to their own majors but to majors in other programs. This knowledge base is critical to disciplines such as agronomy, horticulture, botany and microbiology. Faculty has developed a multimedia work station, which includes 10,000 color photographs to be used in the teaching program. Graduate students are engaged in research projects both on campus and at the various research and education centers around the state to better utilize faculty at various locations. A new brochure was developed for the interdisciplinary program in plant physiology. Students involved in this program are from biological sciences, horticulture, plant pathology, agronomy and forest resources.

Poultry Science

The poultry industry has supported this program through excellent scholarships and recruitment efforts. Placement information indicates there are more jobs than graduates. Interested students also are provided financial assistance to attend the International Poultry Exposition in Atlanta, Ga. Twelve students with interest in animal physiology, nutrition and microbiology are enrolled in the graduate program. Dr. Glenn Birrenkott received the national NACTA award for excellence in teaching. The poultry club is very active in a variety of activities such as the annual publication of *The Brooder*, and raising funds for the farm flood relief program.

SOUTH CAROLINA AGRICULTURAL EXPERIMENT STATION RESEARCH SYSTEM

The S.C. Agricultural Experiment Station Research System, based at the Clemson campus, consists of laboratory and field facilities at Clemson and at four research and education centers across the state.

The system utilizes the expertise of scientists throughout the University to conduct the state's mission-oriented research in food and fiber production, natural resources and the environment. The system's facilities provide indoor and outdoor laboratories for scientists in each of the departments described in this section.

The Simpson Experiment Station near Pendleton serves as an outdoor laboratory for researchers and faculty on the Clemson campus. Research programs are also conducted at the following facilities: the Edisto Center in Blackville, the Sandhill Center near Columbia, the Pee Dee Center in Florence and the Coastal Center in Charleston.

These diverse geographic locations make it possible for researchers to conduct studies and carry out experiments relating to growers and crops in several areas of the state, allowing for the special circumstances and conditions of the different soils and climates.

The Experiment Station continues to adapt its research to the needs of the state's agricultural community and meet the needs of the rapidly expanding turfgrass and ornamentals industries.

Cooperative research projects are under way with other states to avoid duplication and to build on the foundation of information acquired through other research programs.

The following summary is a capsule review of the extensive research programs under way in a number of areas.

Agricultural and Applied Economics

The following are results from research projects for FY '93-94. These results do not include findings from all departmental research projects.

- A study of transport facilities in Brazil on the comparative costs of providing soybeans to Rotterdam showed that South Carolina and the Southeast region are competitive with Brazilian beans for the European market because of Brazilian internal policies that raise cost of their beans. A change in these policies would significantly affect the southeastern soybean industry.
- Landowners reported an estimated 7.6 percent (\$52 million) of crops were lost to deprivation from deer in 1991. Vegetables, tobacco and soybeans received the greatest damage with almost 70 percent of the soybean acreage damaged. A reduction in the number of deer is suggested as the most cost effective method of reducing deer population and therefore crop damage.
- A study of the S.C. wholesale greenhouse industry markets found that buyers and sellers agree on the importance of many major marketing factors but disagree in areas that affect the way producers advertise, address customers' needs and view industry growth.
- Tests were conducted to determine if future price ranges generated from futures and options markets were reliable for farmers and agribusinesses to use in pricing soybeans and corn. The results indicated that soybean and corn prices derived directly from futures prices and options may be used in decision making without a need for adjustments.
- Analysis of the impacts of the Charleston Naval Base closing during the next three years revealed negligible economic or local fiscal effects on Mount Pleasant, but significant adverse impacts on Hanahan. Goose Creek and Summerville can expect some short-term losses in local economic activity but should resume strong growth by 1996.
- A state-by-state study of the textile manufacturing industry indicates there is a direct correlation between distance from the geographic center of the industry and the speed of adjustments to changing market signals in capital and labor inputs. Further tests focusing upon different industries continue to be investigated.
- The spill-over of metropolitan growth to rural areas generally was limited to areas at the fringe of the urbanized areas. Rural communities more distanced from metropolitan centers experience few, if any, economic benefits from urban growths.
- A study of the cost of operating nursing homes in South Carolina revealed that: (a) costs vary widely with daily cost averaging around \$80 in the "high-cost" homes but only around \$55 in the "low-cost" homes, (b) on average, operating costs are no higher or lower in rural areas than in large urban areas, i.e., Greenville, Columbia and Charleston.

- New approaches were defined on the economic analysis of investments in international development projects. The World Bank and Asian Development Bank are using these findings to make the first major revisions in two decades of the guidelines on economic analysis of investments. A book is being published from this study.

Agricultural and Biological Engineering

The mission of the Agricultural and Biological Engineering Department is to provide the engineering input for the management of agricultural and biological systems and human and natural resources for effective and efficient production, processing, storage, distribution and utilization for the food and nonfood needs of society.

After a 1989 revision of the agricultural engineering curriculum, we have had a very encouraging response from our students. Students can choose one of four emphasis areas: natural resources, food, biotechnology or agricultural production/consumer products. The enrollment has increased threefold. This modern curriculum will better meet the needs of the students and, subsequently, the employees. This past year, two of these students were recognized in the College of Agricultural Sciences and the College of Engineering as a top sophomore and senior. Never in the history of the department has this been achieved.

One extension program will be highlighted in this report. Two faculty members have taken the leadership in programs dealing with solid waste management in South Carolina. The faculty has been very successful in getting external sources of funds to carry out these programs. They have utilized extension county staff and volunteers. The programs include: home composting, household hazardous wastes, hotel recycling, Master Waste Education, an in-school curriculum for S.C. schools, regular newsletters and a landfill operator's short course.

About 40 active research projects cover the areas of agricultural production, food engineering biotechnology, aquaculture engineering, environmental issues and soil/water interactions. One of these projects deals with the nonpoint source pollution along the coast of South Carolina. This S.C. Port Authority and S.C. Coastal Council funded project is in cooperation with the departments of Civil Engineering and Environmental Toxicology. Experiments will be conducted to determine the effectiveness of vegetative filter strips to control nonpoint source pollution. The site of the research is the Clemson University Coastal Research and Education Center near Charleston. A number of experimental designs are being used to include: natural grass strips, mowed strips, overseeded strips and bare plots.

Agronomy and Soils

Agronomy and Soils faculty made significant advances in the following areas:

Breeding of new plant varieties:

Dillon, a new variety of soybean and Clemson 200, a new variety of wheat, were developed by plant breeders Dr. Emerson Shipe and Dr. Doyce Graham, respectively. The new cultivars are added to the list of public varieties that have multipest resistances and high productivity.

Cytogenetics:

Dr. Halina Skorupska and her scientific associates have localized several genes responsible for resistance in soybean to the cyst nematode. The source of the

resistance was found in two exotic plant introductions, one originating in Russia the other in the People's Republic of China. The goal of this work is to contribute genetic material to Clemson's soybean breeding program and help to develop strategies for improved resistance to this nematode, which is of major economic importance.

Waste Management:

Dr. Bill Smith's research on land application of wood ash and other wastes has documented that such materials may be "recycled" on forest lands if accompanied by good management practices without danger of groundwater pollution. In cooperative work with the Bureau of Water Pollution Control and the Division of Solid Waste Management in DHEC, Drs. Quisenberry and Franklin have developed guidelines for the land application of a variety of nonhazardous wastes that can be used for their beneficial value on agricultural and forest lands. These applications of soil science can reduce greatly the amounts of municipal, industrial and electric utility wastes which are currently put in landfills.

Weed Science:

Dr. Edward Murdock has developed performance data and management strategies for the use of herbicide resistant crops in South Carolina. When these crops are commercially available, Clemson's Experiment Station and Extension Service will have the knowledge to advise farmers on how to effectively incorporate these technological advances into their cropping systems. Preliminary results indicate that \$23/acre might be saved in herbicide use as a result of adopting certain strategies.

Animal, Dairy and Veterinary Sciences

The Department of Animal, Dairy and Veterinary Sciences carries out research, teaching and extension work that focuses on beef and dairy cattle, swine, horses, sheep and goats. Personnel in the department work in the areas of animal breeding, reproduction, nutrition, dairy products, meat science, dairy and livestock production and veterinary science.

Uterine luminal fluids (ULF) from pregnant and nonpregnant gilts (days 10 to 18) were analyzed for growth factors (epidermal growth factor, EGF; and insulin-like growth factor I, IGF-I). The ULF of nonpregnant gilts had more ($P<0.05$) EGF than pregnant gilts with an overall average of 111.1 ± 13 and 52.4 ± 16 ng/ml respectively. There were differences by day and status, but no pattern or relationship was detected. Concentrations of EGF were as low as 10.7 ± 37 on the first day of estrus to a high of 181.9 ± 34 on day 14 for nonpregnant gilts and 122.4 ± 29 on day 10 to 19.0 ± 31 on day 16 of pregnancy. In oviductal fluid, concentrations were consistently around 1.0 ng/ml on all days. The serum and plasma collected on the same days also were low, approximately 1.0 ng/ml. No differences ($P<0.05$) were detected. Concentrations of IGF-I in ULF also fluctuated by day and status ($P<0.05$). In the ULF IGF-I ranged from a high on day 10 of 62.7 ± 19 to a low of 5.0 ± 22 on day 18 in nonpregnant gilts; and 168 ± 15 on day 12 to 8 ± 15 on day 18 in pregnant gilts. Oviductal fluid IGF-I ranged from 5 ± 2.4 on the first day of estrus to 1 ± 2.0 ng/ml on day 18 ($P<0.05$) with no significant differences due to pregnancy status or day. Lower EGF in pregnant females may reflect uptake by the conceptuses. IGF-I also is likely to be produced locally, although it was not possible to verify in this study. Overall higher concentrations of IGF-I in pregnant gilts, yet decreasing continuously, suggests either a decreasing requirement for IGF-I by the conceptus or an increasing capacity

to produce it. Abstracts have been submitted from this study, but have yet to be acknowledged as accepted for presentation.

Southern blots of ewe genomic DNA were done to confirm that bovine and human cDNA probes could detect 3 β -hydroxysteroid dehydrogenase as a preliminary step in trying to identify the pattern of expression of that enzyme during gestation in the ewe.

A two-year study on comparative aspects of ovarian function among Arabian (A), Quarter Horse (QH) and Tennessee Walking (TW) mares has yielded the following preliminary results: Length of estrus (days) was longer during the spring in TW (6.8) than in QH (5.8) mares. The period between estrus and ovulation (hours) was longer in TW (125) than in QH (93) mares, and the diameter (mm) of the preovulatory follicle was smaller in TW mares (38.8) than in A (45.3) or QH (43) mares. This information will assist horse breeders and veterinarians when making breeding management decisions in the above breeds.

Sixty to 70 percent of the broodmares in South Carolina cannot be bred during December and January due to ovarian inactivity caused by a photoperiod of short days and long nights. A study was performed to examine the efficacy of a continuous (2 week) intravaginal progesterone treatment on the resumption of ovarian activity. In phase I of the study, 12 anestrous mares were treated with progesterone release intravaginal device (PRID, Hamilton, New Zealand), and eight mares received a dummy implant. Contrary to expectations, response to this type of treatment was poor in stimulating estrous behavior. In phase two of the study, the bacterial population of the clitoris and vagina before and after insertion of the vaginal implant (PRID) is being studied.

It has been reported that in the presence of BSA, growth factors don't increase the growth of 2-, 4- or 8- cell embryos. In the near absence of BSA we are finding an effect of growth factors.

Our laboratories are investigating whether there is gene expression for estradiol, its receptor, EGF, its receptor and several other growth factors in porcine conceptuses flushed from the uterus on days 12 through 18. Thus far we have evidence for aromatase on day 12 and for its receptor and EGF on day 12 and 14. Also, there is expression for aromatase and the estrogen receptor in uterine endometrium of the pregnant gilt. We expect to publish two papers from this study in a respected journal.

We have developed receptor assays (RA) for these two growth factors and have shown specific binding by bovine spermatozoa. Capacitation of the sperm increases receptor number. In cooperation with 21st Century Genetics (Wisc. bull stud), we will be measuring the effects of EGF and IGF-I on the sperm's capacity to fertilize *in vitro* matured oocytes.

Work continued this past year on development of fatty acyl amides as protected fat supplements for ruminant diets to increase unsaturation of body tissues. Specifically, butylsoyamide was developed and tested. In a study with sheep, feeding butylsoyamide increased blood unsaturated fatty acids more than threefold compared with an unprotected soybean oil supplement.

Studies on the deposition and metabolic effects of trans fatty acids in ruminant tissues were completed. Sheep fed added fat were shown to have elevated concentrations of trans fatty acids in adipocytes and their plasma membranes. In a follow-up study, metabolism of rat adipocytes was inhibited by trans fatty acids, regardless of positional isomer. This demonstrates that consumption of trans fatty acids from meat and milk inhibit metabolism similar to trans fatty acids consumed from hydrogenated cooking oils.

Work also is continuing on examining the effects of fatty acid structure of plasma membranes on metabolism and growth of microbes. A \$170,000 grant from SCURF was awarded to continue this work.

A \$33,500 grant was just received from Fats and Proteins Research Foundation to study interactions of fat and fiber on digestion and lactation performance of dairy cattle.

The second of a three-year nutritional evaluation of tropical corn silage-based TMR compared with temperate corn silage-based DMR when fed to lactating Holstein cows has been conducted. Milk performance and composition, as well as feed intake, were not affected by use of tropical corn, although tropical corn produces less grain than temperate corn, suggesting higher digestibility of the tropical corn plant itself. A digestion trial has been carried out, and lab analyses are being conducted to determine dry matter, crude protein, acid detergent fiber and neutral detergent fiber of both TMR's.

Work began years ago as an applied project involving low pregnancy rates in cycling cows losing weight, has evolved into basic research into follicular growth and development and corpus luteum function. Just prior to anestrus, suckled beef cows show estrus, but develop a subfunctional corpus luteum which grows and develops normally but secretes very low levels of progesterone. Endocrine studies have now shown this is not related to bioactive or immunoreactive bifurms of LH, nor to LH biopotency. However, IGF-1 and insulin are low in the cycle prior to development of a subfunctional corpus luteum, and this causes the ovulatory follicle, which subsequently develops into a subfunctional corpus luteum, to be smaller.

Aquaculture, Fisheries and Wildlife

Brown trout horizontal and vertical movements in relation to water temperature and dissolved oxygen were studied in Jocassee Reservoir. Temperature-sensitive radio transmitters were surgically implanted into trout, and fish were located regularly with a directional antenna and radio frequency receiver.

Research results indicate that 20 out of every 100 deer in a coastal S.C. white-tailed deer population were lost to nonhunting mortality factors. Hunting raccoons with dogs does not affect white-tailed deer movement or visibility at deer hunting stands during and after raccoon chases.

Preliminary results of research on Camp Lejeune's wild turkey population indicate that relatively low reproductive success is most likely due to higher than normal poultry mortality, which is most likely due to less than optimal habitat conditions. Occasional short-term introductions of large numbers of people (military ground troops) or loud noises (artillery battery fire) into wild turkey habitat probably has only a limited and temporary impact on wild turkeys inhabiting those areas.

Analyses of heavy metal whole-body burdens of small mammals and herpetofauna inhabiting pine plantations in coastal South Carolina indicate that recycling bark boiler ash from paper mills by land-spreading on these sites does not have a negative impact on these species.

The effects of simulated deer damage on soybean growth and yield is providing information about times when deer management and control should be implemented to avoid damage and refine deer damage assessment criteria.

Preliminary results of a deer impact study show that reducing deer densities is beginning to reduce crop damage. Human dimensions of this type of community effort also are being examined.

Economic impact of hunting on private lands in rural South Carolina: contributes \$6-8 million to local community and county economy.

Six researchers at Clemson are evaluating a new production and waste management system for producing channel catfish. The "partitioned aquaculture system" (PAS) is designed to separate the fish production unit from the wastewater unit for

better management of fish production and waste removal. The modular units have wastewater treatment section (for blended algae culture) and a raceway section for fish confinement and solid waste removal. Water is moved through the system with a unique paddle circulator designed at Clemson. The dissolved oxygen will be monitored by a smart system which controls the rate of water flow. The system could dramatically improve the efficiency of growing catfish by reducing construction costs, reduced water usage, increased production, reduced feed conversion ratios exclusive of predatory birds, improved fish health management, increased harvesting efficiency and improved water quality.

Entomology

Faculty of the Entomology Department continued efforts to enhance the quality of life by improving available methods for fighting harmful species of insects. Chemical insecticides still are viewed by many as being the primary method for prevention of damage to plants or transmission of disease-causing organisms to man and other animals. Considerable effort and resources were devoted to genetic studies, biological control and cultural methods in addition to reduced use of chemical insecticides.

International involvement continued with the expansion of our Indonesian research project and cooperative work with Japanese entomologists. Pathogens received from the Indonesian project were evaluated and are being maintained. S.C. farmers will benefit tremendously if some of the biological control agents prove successful under our growing conditions. Several companies have expressed interest in supporting cooperative research in this area.

On cotton, research at Edisto REC continued to indicate that early season applications for tobacco budworm are largely unnecessary. Armyworms are becoming serious pests, and effective control strategies have not been developed. Entomologists at the Pee Dee REC found genetically engineered cotton lines containing a toxin produced by a naturally occurring bacterium to be highly resistant to the bollworm and tobacco budworm. Apparent benefits of this technology will be the drastic reduction of chemical insecticides used on cotton. Other research indicated that the ovicide amitraz enhances the activity of low rates of pyrethroid insecticides. Successful use of low-rate insecticide mixtures reduces selection pressure for resistance to pyrethroids and conserves beneficial insects, desirable resistance management strategies.

Wheat insect monitoring research at Edisto REC was used to correctly predict low levels of virus in the 1994 crop and avoid unnecessary treatment. Record wheat yield (54 bu/acre) was the fourth record in the past eight years following implementation of key insect management programs. State average yield has increased from 27 bu/acre from 1983-85 to 42 bu/acre for the 1986-94 period, primarily because of successful insect management programs.

As a result of field research on the impact of newly labeled and developmental fungicides on preventative insecticides on peanuts, some of the largest producers have avoided preventative insecticide treatment for the first time in 14 years.

Effective control of citrus red mites on plants in an enclosed shopping mall was achieved for more than 200 days by the exclusive use of predaceous mites. Biological control is preferred and is almost necessary in enclosed malls where the use of chemicals is practically unacceptable. The pest management system developed by this research now is being successfully used by the mall management company.

Evaluations of insecticides for mole cricket control on turfgrass have shown that specific chemicals are effective only at certain times of the year. Knowing what

works best on a given date will reduce the amount of pesticides used due to repeated applications because of poor control.

Food Science

The major overall research objective of the Department of Food Science is to provide pertinent and timely information to the citizens of South Carolina so that they may make appropriate economic decisions. In doing so, it is anticipated that the citizens of the state may remain competitive in our expanding global agricultural marketplace.

Thus, Clemson's Department of Food Science continues to provide research leadership in the areas of food safety and quality, application of biotechnology to foods through microbiology and innovative processing techniques to lengthen the shelf-life of foods.

A combined effort between the Clemson Food Science Experiment Station faculty and the Cooperative Extension Service faculty has allowed development of a program in hazard analysis, critical control points for the S.C. meat processing industry. This program now is available to food processors in South Carolina through the Department of Food Science.

Food Science research in bacteriocins may lead to mechanisms by which native food components restrict or eliminate food-borne illnesses. Current research is investigating how such components can be produced and utilized in food products. Such research has led to the current construction of a state-of-the-art biotechnology laboratory at Clemson.

Clemson's food science research in edible films, packaging technology and spoilage mechanisms strives to achieve a decrease in environmental effects associated with the packaging of food, and for an increase in the shelf-life of food products. Success in either or both of these areas will benefit the economic viability of S.C.'s food industry. This research has led to completion of a "world class" food packaging laboratory at Clemson University, located in Newman Hall.

The Department of Food Science continues utilization of land-grant university opportunities to transfer newly developed research information to citizens of the state of South Carolina. These opportunities exist through the land-grant university's cadre of Cooperative Extension specialists. The unique cooperation between the research and extension faculty in this land-grant University allows rapid dissemination of new knowledge to S.C.'s citizens.

Horticulture

The Horticulture Department's mission is to promote personal and professional growth through the discovery, communication and application of horticultural experiences, knowledge and scholarship. Our work fosters environmental stewardship while improving the economic well-being, health and quality of life for all. Undergraduates, graduate students, members of the horticulture industry and the consuming public are benefactors of these research and educational efforts.

A formal agreement was developed with Horry-Georgetown Technical College to create our first distance-delivered degree program in turfgrass. A student now can complete the turfgrass four-year degree without ever attending classes on the Clemson University campus. One of our faculty members received the Governor's Professor of the Year Award, the highest award given to a faculty member at any college in any discipline in the state.

In our extension programs we attracted record numbers of attendees at the Clemson Turfgrass Conference and the Southeast Greenhouse Growers Conference. In addition, there was excellent attendance at the S.C. Landscape and Turfgrass Association annual meeting, the Peach Convention and the Nurseryman's Short course. The educational programs are coordinated through extension efforts in the Department of Horticulture.

An educational program for youth was developed in The S.C. Botanical Garden. This program focuses on using the garden as a base for education and healing. In addition numerous new niche gardens were constructed with private resources in the state garden.

The following items are research highlights from the past year.

- A new rootstock variety that shows resistance to peachtree short-life, the most devastating disease in peach-tree production, was released from our program after several years of testing.
- Construction of the new Musser Farm facilities near Clemson was completed. Buildings include a security residence, a main building (for farm office, laboratory and work space, fruit processing, including a computerized grading line and cold storage), and an equipment shed/shop building. Other plans include building an irrigation system and a pesticide storage and handling building.
- AAC and Chang Ji farm administrators from China met with the University administration and private seed companies regarding continued collaboration on research on generation of new watermelon and melon hybrids and subsequent increase in hybrid seed. The advantages of increasing the seed in China are the same as for hybrid seed production — well-trained labor, reasonable costs, isolation in an environment with minimal cucurbit diseases.
- Scientists working in conjunction with a commercial nursery developed methods to reduce the movement of pesticides into water systems. This project promises to reduce environmental impact from pesticide use.
- Horticulturists have made significant progress into the amelioration of stickiness associated with sweet potato whitefly honeydew deposits. This thrust has led to strengthened ties with basic researchers at the USDA and to the awarding of a new grant in alternative vegetable pest control measures.
- In the USDA-funded project, Alternative Cropping Systems, Clemson horticulturists are cooperating with colleagues at N.C. State University and the University of Georgia to study plant nutrient cycling and vegetable crop responses to reduced tillage. This study included measuring nitrate movement in the soil as well as nutrient uptake by the growing crops.
- A research program from the USDA on alternative pest control methods for vegetables was continued. This is in conjunction with the Plant Pathology and Entomology departments. The objectives are to: develop and evaluate microbial pest control agents to control plant pathogens and insect pests of vegetables; develop innovative cultural practices for vegetable production systems in South Carolina that reduce the amount of chemicals sprayed on plants; assess the role of indigenous predators, parasites and pathogens in controlling pests; and to consider the presence of natural enemies in management decisions.

The Institute of Wildlife and Environmental Toxicology/TIWET

The Institute of Wildlife and Environmental Toxicology (TIWET) and the Department of Environmental Toxicology, in a unique interdisciplinary approach, continue to investigate an array of environmental problems throughout South Carolina and nationally and internationally as well. TIWET faculty, staff and students have a clearly defined mission statement: "Excellence in research, education and public service programs in environmental toxicology; seeking the best scientific data possible as a foundation for resolving ecological conflicts between aquatic and terrestrial wildlife resources and toxic substances released into the environment."

Research emphasis areas are aquatic toxicology, wildlife toxicology, environmental chemistry, analytical toxicology, biochemical and behavioral toxicology and ecological risk assessment. Research highlights include expanded activities in environmental studies on hazardous waste sites at the Savannah River Site and elsewhere in South Carolina. In addition, three projects were initiated at the Rocky Mountain Arsenal near Denver, Colo. to investigate the effects of hazardous waste on wildlife and to evaluate ecological risk on these sites.

Ecological modeling and risk assessment continue to be a major area of research interest. Publication of a book titled, "Wildlife Toxicology and Population Modeling: Integrated Studies of Agroecosystems," published by CRC Press/Lewis Publishers, will be a major contribution to the field of ecological modeling and risk assessment. The book was edited by Dr. Ron Kendall and Dr. Tom Lacher. An additional book published through the American Society for Testing and Materials, "Environmental Toxicology and Risk Assessment: Second Volume," edited by Joseph W. Gorsuch, F. James Dwyer, Christopher G. Ingersoll and Thomas W. La Point, is likewise a significant contribution.

Cooperative research activities between Clemson-TIWET and Iowa State University continues at TIWET's Edith Angel Environmental Research Center in Chariton, Iowa. This study is investigating the effects of "conservation headlands" and field border management on quail and other wildlife species relative to habitat mitigation on farm to offset possible negative impacts of agricultural chemical use.

Coastal Research and Education Center

The primary responsibility of the Coastal Research and Education Center is to develop efficient and economical systems for vegetable production in South Carolina. A primary goal is to become a center of excellence in vegetable research.

A virus that attacks caterpillars in Indonesia has been imported through a USDA quarantine laboratory and has been found to attack cabbage loopers and soybean loopers here in the U.S. There is good potential for development of this virus in conjunction with a biological insecticide industry.

Use of the pheromone (sex attractant) of the tomato pinworm was sufficient to suppress populations of this pest to noneconomic levels in a commercial tomato grower's field. Pheromones used to disrupt mating of the tomato pinworm will become a key management tactic for S.C. tomato growers.

Integrated pest management strategies and tactics are being developed for southern pea in South Carolina and in Ghana. The pest insect complex in South Carolina and Ghana are very similar and development use of ecologically compatible tactics is relevant to both geographical regions.

The addition of an optical brightener (such as those used in laundry detergents) has been shown to enhance the activity of microbial insecticides. The granulosis

virus of the imported cabbageworm was more efficacious when the brightener was added.

Studies to determine the efficacy of a tiny wasp parasite (*Trissolcus basal*) that attacks the eggs of the Southern green stinkbug, have shown that about 4,000 wasps per acre should effectively suppress the pest. The parasite can be easily produced using freezer-stored stinkbug eggs.

A collard insect management program is being tested in a commercial growers field in conjunction with Charleston County Extension personnel. Preliminary tests resulted in reduction of chemical pesticide treatments with no loss in yields.

In cooperation with the Center for Disease Control and the S.C. Tomato Association, a model HACCP (Hazard Analysis Critical Control Points) was designed and implemented in our largest tomato packing house, which effectively controlled the risk of *Salmonella* contamination of tomatoes. Application of the model to other fruit and vegetable handling systems is proposed.

A patented plastic film impregnated with fungicides and/or antioxidants was utilized for packaging of watermelons, cantaloupes and honeydews. Bananas also were tested because of their extreme susceptibility to *Anthraxnose* decay. The film was not effective in controlling decay, however the capacity of the film for atmospheric modification dramatically extended the shelf life of bananas and appeared to be effective for honeydews.

Analysis of peach post-harvest handling systems for six commercial operations identified the principle critical control points for improving fruit quality through better post-harvest management. Skin discoloration and decay were the primary causes of losses in the industry in the 1994 season.

A detailed analysis of the features of nectarine ripening, including changes in respiration, ethylene production, firmness, internal and external color, water content and internal breakdown was conducted at three temperatures in support of a program in food packaging to develop a computer model for choosing appropriate plastics for modified atmosphere packaging.

An on-farm research study conducted in response to severe post-harvest losses of watermelons due to *Phytophthora* demonstrated that treatment of the fruit with chlorinated water immediately following harvest dramatically reduced the incidence of decay and provided fruit with more acceptable appearance to the retail outlets.

Evaluation of heat tolerant broccoli cultivars continues. The following cultivars produce fresh market quality heads through the heat and humidity of Charleston summers: Baccus, Green Comet, LePrac and Paragon. Research continues to replicate and verify that these cultivars are heat tolerant.

Forcing asparagus in summer is a viable alternative enterprise for coastal vegetable growers. The best times for forcing, however, are in July and August. Cutting pressures as high as nine to 12 spears/plant will produce acceptable commercial yields. Research continues to determine ways to extend the forcing production season longer than the characteristic two weeks.

Sweetgrass, used in the production of African-coiled baskets, has been domesticated and now is under cultivation at McLeod Plantation and Dill Sanctuary on James Island. Research has determined how to propagate new seedlings from seed, and now copious supplies of plants can be grown from seed to establish more inland plantations of sweetgrass. There are now three-and-one-half acres established: two at McLeod Plantation and one-and-one-half acres at Dill Sanctuary.

Research continues to refine the fertility needs of fresh market tomatoes and snap beans grown in rotation and after winter cover crops of wheat or crimson clover. We have determined that applied nitrogen fertilizers leach deeply into the soils and that winter cover crops can remove these residues and possibly prevent ground water contamination. The TriState project moves into its fifth year of evaluating these low input sustainable production practices.

Fungicide application intervals were tested for gummy stem blight control on watermelon. Early (three sprays) and full-season (six) applications reduced disease compared with no fungicide, but weight of marketable fruit and economic returns were lower with less than six sprays. Yield was reduced by 38 percent in plots which were not sprayed. A minimum of six fungicide applications are required to manage gummy stem blight adequately on watermelons grown in seasons with above average rainfall.

Fusarium wilt of basil, a new disease in South Carolina, was detected in Charleston and Lexington counties. Plant height was reduced by 30 percent and leaf area by 40 percent. Fusarium wilt reduced fresh weight of sweet and lemon basil but had no effect on oregano, rosemary, sage, thyme, catmint or lemon balm. Three fungicides and Mycostop (a biocontrol product) did not control this disease. Producers and consumers should avoid purchasing contaminated seed and plants.

Solar heating of soil under plastic mulch during summer again controlled belly rot on fall-grown pickling cucumber. Pathogen numbers in solar-treated soil were reduced by 80 percent, which resulted in a 55 percent decrease in the number of diseased fruits. Control with solar heating was equivalent to chemical control.

Three methods to schedule fungicide applications for early blight control were tested on fresh market tomatoes. A calendar-based schedule resulted in 10 weekly sprays, a prediction model called "tomcast" decreased the number of sprays to six, while scouting according to S.C. tomato IPM guidelines decreased the number to four. Marketable yields of mature green fruit were not appreciably affected by the reductions in pesticides.

Edisto Research and Education Center

The Edisto Research and Education Center's mission is to conduct research, extension and teaching programs that focus on agricultural problems unique to the Coastal Plains region. Multi- and interdisciplinary team approaches are utilized to solve existing problems.

The goal at the Edisto REC is to develop, evaluate, transfer new and improved technology and incorporate it with traditional practices into production systems that enhance agricultural production and profit while protecting the environment and natural resources. Research/extension programs focus on cotton, peanuts, small grains, soybean, beef cattle, forages, melons, sweet potato and promising alternatives such as canola.

The faculty at EREC has developed Integrated Pest Management (IPM) systems for wheat, cotton, soybean and peanuts to minimize pesticide use and conserve beneficial insects, developed interseeding systems for planting soybean and cotton into standing wheat, determined the extent of nematode infestations in cotton and soybean and established economic thresholds for major nematode species and has established winter forage grazing systems for beef cattle. We are the home of the Edisto Forage Bull Test; in 1993 we sold 43 bulls at an average of \$2,334.88.

An international program has been developed with Indonesia utilizing IPM techniques in soybean and vegetable crops. As a result, we were one of 16 universities to receive a McKnight pre-proposal planning grant out of 250 + submitted.

EREC is an important resource for area educators. We reach at least 1,000 students from kindergarten to college each year. The 1994 third annual Farm and Home Day attracted some 1,500 visitors; more than 300 children participated in the children's program.

Edisto REC scientists confront real world problems everyday through contact with county extension agents, agricultural producers and the general public.

Pee Dee Research and Education Center

The Pee Dee Research and Education Center, established in 1911, continues to serve this region where more than 50 percent of the agricultural income is produced.

Results from conservation tillage studies showed no-till winter wheat yields were similar to those of wheat grown with conventional tillage practices when the soil was paratilled before planting. The paratill caused little disruption of surface residues and may eliminate the need for using traditional deep tillage devices which favor soil erosion and enhance soil water loss. Higher soil water contents were maintained during the growing season when no-till practices were utilized to produce soybeans, compared with conventional tillage practices. Preliminary results indicate soybeans planted in narrow rows, when paratilled, utilize soil water more efficiently and can potentially produce higher yields than soybean planted in more traditional, wider rows (regardless of surface tillage used).

Other wheat studies show the rate of sugar movement into wheat grain was found to be far below the rate of sugar production by wheat plants under a wide range of growing conditions. Because of this growth limitation, management practices which favored high rates of sugar production during grain fill had little effect on final kernel weight. Other studies comparing wheat cultivars and different management practices showed wheat yield to be highly correlated with the number of kernels per unit area, but not with kernel weight. These results indicate future breeding efforts aimed at increasing wheat yields should focus on selecting genotypes with a high number of kernels per unit area.

The bollworm and tobacco budworm are major economic pests of cotton. Genetically engineered cotton containing a toxin produced by a naturally occurring bacterium was evaluated and found to be highly resistant to these pests. This technology will drastically reduce the use of insecticides on cotton.

Insect populations were monitored in conservation tillage cotton. Thrips numbers exceeded one thrips/plant prior to the four-leaf stage of development in fallow plots. These data provide substantiating evidence that chemical treatments of tobacco budworm during June are not always necessary. Natural enemies regulated tobacco budworm and cotton bollworm. In addition to predators, an egg parasitoid was very effective (57 percent incidence of parasitism) by early August. Aphid populations were decimated by an entomopathogenic fungus. Species of aphids and their natural enemies are being determined.

Soil applied poultry manures and litter were shown to reduce the numbers of root-knot nematodes, an important pathogen of vegetable and field crops. Application rates were chosen that were environmentally sound and only provided sufficient nitrogen for crop growth. This research provides increased evidence to the value of poultry litter and manures as a component in sustainable cropping systems in the Southeastern United States. This research provides another use of an agricultural waste of the poultry industry in South Carolina and potentially reduces our reliance on pesticides for the control of this widespread disease.

The number of greenhouses for tobacco transplants has increased in the last few years. Waste nutrient solution from more than 100 tobacco seeding greenhouses was analyzed to determine nutrient use efficiency. Results indicate that 81 percent of growers follow extension fertilization recommendations in the greenhouse. In those cases, 93 percent of applied nitrogen and 75 percent of applied phosphorus were taken up by the seedlings. Phosphorus efficiency is expected to increase with grower adoption of low phosphorus fertility programs developed at the Pee Dee Research and Education Center.

On-farm research demonstrated to growers that crop rotation (to certain crops) and varietal resistance can pay bigger dividends in improved crop growth than soil-applied chemicals for the control of the bacterial pathogen *Pseudomonas solanacearum*. Data from this and similar sites are used in educational programs to reduce reliance on chemical control of pathogens where possible.

The PEAK Summer Institute for Science in Agriculture was very successful. It has teamed scientists, extension agents and teachers together in educational programming; demonstrated to educators the importance of agricultural research as an educational resource; and motivated educators and scientists to work together as a total educational community.

A Cotton Scouting School was held at the Pee Dee Research and Education Center on June 1. This is the 10th year in a row that 50 to 100 students have attended this one-day session to receive training in identifying and monitoring insect, weed and disease pests. Knowledgeable scouts provide the basis for an integrated pest management program on the farm.

During the fall the center hosted 1,440 elementary school students, teaching them how agriculture affects their lives. During the spring the center hosted more than 200 high school science students, informing them of possible career opportunities in the agricultural sciences.

Sandhill Research and Education Center

The Sandhill Research and Education Center (SREC) is the Midlands branch of the S.C. Agricultural Experiment Station and is situated on approximately 1,000 acres 14 miles northeast of Columbia. Previously conducting research on the production of vegetables, peaches, pecans and swine, the center recently has refocused its programs on urban and environmental horticulture.

The mission of the SREC is to conduct research and extension education programs inspiring a greener environment. The vision of the center is to become a regional leader and nationally recognized center of excellence in urban and environmental horticulture, enhancing the quality of our urban and suburban environment. Interdisciplinary programs develop and disseminate environmentally sound practices for the production and use of landscape plants and turfgrasses. The technology developed by research programs is transferred to homeowners, nursery growers and others by extension programs using the public gardens as a field laboratory for educational programming.

The master plan for the center has been completed and implementation of the plan has been under way for two years. While programs are fiscally supported by the state of South Carolina, more than 30 collaborators also have supported the programs of the Sandhill Research and Education Center during the past year.

Horticultural research under way includes the evaluation of landscape plants and turfgrasses for S.C. growing conditions, low input landscape maintenance, residential landscape maintenance, right-of-way vegetation management, highway wild-flower plantings and biological control of parasitic nematodes attacking turfgrasses. Plant evaluations include the national flowering crabapple evaluation, the national Bermuda grass evaluation, a collaborative evaluation of Asian hollies and studies of wildflowers and a number of native and low-maintenance grasses for use on S.C.'s highways.

Environmental gardens have been initiated primarily through grant funding exceeding \$40,000. Demonstration gardens in various stages of completion include the Backyard Wildlife Habitat, Midlands Home Composting Garden, Sanders Home Cottage Garden, Carolina's Xeriscape Demonstration, Native Habitat Learn-

ing Center, Wildflower Meadow and the Children's Garden. In addition, grant funding has been secured for general landscaping at the center.

Animal science research at the center was highlighted by the activities of the Swine Evaluation Center. This program evaluates breeding boars for their fat content and efficiency of feed conversion. In the past five years, average daily weight gain has increased by 9 percent, average back fat has decreased by 17 percent and pounds of feed required per pound of weight gain has decreased by 6 percent. This program significantly impacts the competitiveness of small farmers in our state.

The upcoming year promises continued success in the implementation of the new mission of the Sandhill Research and Education Center. Research programs will expand, and additional demonstration sites will be completed. The faculty and staff of the SREC look forward to new and ongoing partnerships which further Clemson programs in urban and environmental horticulture.

COOPERATIVE EXTENSION SERVICE

For 80 years the Cooperative Extension Service, the educational outreach arm of the Clemson University Division of Agriculture and Natural Resources, has provided information and statewide continuing education programs that can make life easier and more enjoyable for every South Carolinian.

The programs cover 16 disciplines relating to agriculture and natural resources, to family, youth and to community development. In addition to general education information, special programs are included for limited-resource farmers and the economically disadvantaged.

Funded by federal, state and county governments, the Cooperative Extension Service was created in 1914 as a nationwide system designed to carry education from land-grant universities to the people. Extension has worked closely with South Carolinians, helping them build better lives through dissemination of practical, useful information within its assigned areas of responsibility.

Originally conceived to help rural residents, extension has responded to the changing needs of those it serves by broadening its scope of activities to include urban and suburban problems.

As Clemson University positions itself for the 21st century, extension is playing a vital role in helping Clemson achieve an expanded outreach effort with the hope that the total resources of the University can be utilized through extension to help the citizens of the state resolve problems they face today.

Clemson, through its Cooperative Extension Service, maintains an office manned by agents in each county. A professional staff of extension subject matter specialists at the University and four research and education centers around the state compiles information from research and translates it into information the people of South Carolina can use day-to-day.

From basic nutrition information to irrigation field tours, extension staff members and volunteers are teachers carrying University educational programs to all areas of the state.

The state's extension program is organized around these broad categories: agriculture and natural resources (including special programs for limited resource farmers), family and youth development (including 4-H Club and the Expanded Food and Nutrition Education Program) and community development.

Extension Service faculty and staff conducting educational programming in South Carolina reported 783,954 clientele contacts. This represents the number of

personal contacts made with clientele in one-on-one contacts and through group meetings. This contact number does not include the number of S.C. citizens reached through extension educational information presented through television, radio and newspapers/magazines which would increase the number of contacts greatly if media contacts could be accurately determined.

Contacts have been broken down into program area categories that reflect seven national extension program initiative areas. Clemson Extension educational programming is accomplished through 81 different program thrust areas that are grouped, by program emphasis, within one of the seven national initiative areas.

In addition to programmatic contacts, clientele also are reached through administrative contacts, which includes advisory committee membership and program needs assessment activities. The total Clemson Extension clientele contacts (excluding media contacts) are as follows:

Agricultural Competitiveness and Profitability	281,947
Community Resource and Economic Development.....	32,670
Family Development and Resource Management.....	47,713
4-H and Youth Development.....	201,516
Leadership and Volunteer Development.....	57,215
Natural Resources and Environmental Management.....	89,937
Nutrition, Diet and Health	129,988
Administrative Clientele Contacts.....	32,910

Clemson Extension faculty and staff reported expending a total of 299.6 man-years in extension educational programming and administrative efforts across all subject matter areas. Using the same national extension program initiative categories used for clientele contacts, efforts were expended in the following areas:

Agricultural Competitiveness and Profitability	104.1
Community Resource and Economic Development.....	5.4
Family Development and Resource Management.....	25.2
4-H and Youth Development.....	39.8
Leadership and Volunteer Development.....	19.3
Natural Resources and Environmental Management.....	20.8
Nutrition, Diet and Health	51.3
Administrative Work (across all areas).....	33.7

As a part of its four-year planning cycle, the Clemson Extension Service in 1991 developed a plan for programming through the mid-1990s. Nearly 1,000 South Carolinians helped extension identify major problems facing the state and prepare a plan to address those problems. In addition, extension's four-year plan outlines educational activity for base and mandated programs related to its mission.

The extension system's plan of work, which meshes well with the University's strategic plan, identifies and addresses issues of concern to a broad spectrum of the state's population.

In putting the plan together, extension's state staff studied the latest demographic information on the area. Situational statements were compiled by extension faculty members on campus and in Clemson Extension offices in each county.

These statements were reviewed by priority identification committees in every county. These committees were made up of a cross section of local county residents. Statewide, more than 750 people served on these committees.

They met, identified local educational needs and prioritized them. Those needs related to extension's mission were consolidated at the state level. The list was studied by members of the State Extension Advisory Council and a team of 22

extension professionals. They recommended nearly 100 items to include in the plan of work.

From among the issues identified, priority is being given to six statewide issues:

- Natural resources management.
- Food quality, safety and nutrition.
- Profitability and sustainability of agriculture.
- Waste management by industry (including agriculture), municipalities and consumers.
- Water quality.
- Community development.
- Family and youth development.

Five of these six statewide thrusts have the environment at the center of their focus. The plan includes 33 educational program thrusts for agriculture and natural resources and four for community development. Reports from these thrusts follow.

Natural Resources Management

The stewardship of all state lands is of great concern to South Carolinians. The 1990 federal farm bill added to extension's mandate to facilitate the stewardship of natural resources.

Extension conducted programs on best management practices to improve the quality of natural resources. Fifty forest landowners attended short courses that integrated forest and wildlife management for profit and recreation.

Damage by deer is a major problem for row crop farmers in much of the state. A joint program with S.C. Wildlife and Marine Resources Department and Clemson Extension is under way to determine management alternatives that will reduce deer damage. A pilot area was established in Hampton County to implement deer population control alternatives and to assess how the changes impact crop damage. Agents, specialists and graduate students are working with landowners to collect data.

Teaching KATE (Teaching Kids About the Environment) is a three-day hands-on learning program for S.C. middle school students. From a pilot program with 551 children in spring 1992, KATE has graduated 8,000 youths. Through KATE, we're building a concern for the use and management of our natural resources. The program has been expanded to a second site. In addition, a national grant was received to develop a second middle school curriculum which will begin in fall 1995.

County programs were conducted for professional foresters and other resource professionals on the use of best management practices on wetlands, forests and wildlife areas. As a result of extension efforts, 10 counties reported 10,950 acres of land managed using best management practices.

Profitable and Sustainable Agriculture

The concept that agriculture can be profitable is readily accepted. But the concept of sustainable agriculture is nebulous. Differences of opinion and perceptions exist because criteria do not exist for measuring sustainability.

Clemson Extension cosponsored the seventh annual Carolina Sustainable Agriculture Conference at Winthrop University. Approximately 150 people attended. Also, South Carolina was represented by a team at a regionwide sustainable agriculture workshop in March in Georgia. Topics included constraints to sustainable agriculture and how to improve sustainable agriculture education and research in the Southeast.

As a result of that conference, about 50 South Carolinians met to discuss sustainable agriculture.

Extension publishes a quarterly newsletter entitled, *Sustainable agriculture — information and perspectives on sustainable, competitive agriculture in South Carolina*, that highlights state and national sustainable agriculture events.

The Edisto Research and Education Center held a Small Farm Field Day in September. While the focus of this day was on the small farmer, it provided an opportunity to promote sustainable agriculture. At traditional field days for commodities such as cotton, small grains or soybeans, sustainable agriculture concepts are discussed.

Clemson hosted the Southern Conservative Tillage Workshop for 250 university, state, and federal agency and industry professionals from throughout the Southern region.

Newsletters produced by specialists in pest management, nutrient management, and soil conservation emphasize sustainable agriculture. Nineteen Clemson Extension agents were selected for intensive training on sustainable agriculture.

Waste Management

Extension continues to contribute significantly to efforts to address solid waste issues and problems in South Carolina. Because of budget problems, other sources of funding have been sought to supplement extension resources for program work. These include funds provided through the Solid Waste Division of the S.C. Department of Health and Environmental (DHEC), grants for recycling projects through the governor's office; funding for publications on composting through the Garden Club of South Carolina and special project funding by local governments in counties where extension is helping solve local solid waste problems. Accomplishments in the past year include:

Master Waste Educator: Eighty-five men and women in 11 counties finished the program and now are trained to share information with the community.

Solid Waste In-school Curriculum: Extension Solid Waste Program Team members in cooperation with the Solid Waste Division of S.C. DHEC and Keep America Beautiful, trained 150 teachers in grades K-8 in fall 1993. Plans to develop an in-school solid waste curriculum for grades 9 through 12 are under way.

Recycling for the Hotel Industry: Solid Waste Program has continued and received contacts with several resort properties. A manual on developing a recycling program is in the final stages of production.

Solid Waste Educational Courses: A day and a half workshop on various aspects of solid waste management for the Professional Educators Access to Knowledge (PEAK) participants.

Educational Materials: A variety of educational materials has been produced by Solid Waste Program Team members to support county extension programs and needs of the general public.

County Extension Solid Waste Programs: County Extension offices continue to be involved in a variety of waste management programs. These programs involve youth and adults, elected and appointed officials, lay community leaders, agricultural producers and businesses. Cooperating agencies and organizations include the S.C. Department of Health and Environmental Control (DHEC), the governor's office, Keep America Beautiful (KAB), the S.C. Recycling Association and other

governmental support organizations such as the S.C. Association of Counties, the S.C. Municipal Association, the 10 Regional Councils of Governments, and Chambers of Commerce. The Palmetto Leadership Program continues to be a vehicle in some counties for involving volunteers in waste management issues. County extension agents continue to serve as members and chairpersons of various waste management related organizations.

Lexington and Richland counties jointly trained 16 volunteers in the Master Waste Educator pilot program.

Charleston County has taken an aggressive approach in dealing with waste management initiatives during the last several years, and extension professionals in the local office have played an integral role with workshops, clinics, exhibits and media to increase public awareness and participation.

Anderson County extension office trained 10 Master Waste Educators and presented recycling programs to two adult literacy groups totaling 32 persons.

Extension programs focus on enhancing and protecting state waters. Programs stress the prevention of water degradation from plant nutrients, pesticides and animal wastes. Extension has identified 35 agents to work with agricultural producers to help them determine the appropriate rates of nitrogen and pesticides needed to produce field corn. Ten agents worked with farmers in the Piedmont to determine the rates of poultry manure being applied to cropland.

Water Quality

Nutrient management: Corn has been identified as the crop associated with greatest agricultural nitrate threat to water quality in the state. Thirty-five agents working in 25 counties have been assigned to work with farmers to establish baseline data on nitrate use on corn.

Pesticide management: Corn has been identified as the crop, and atrazine has been identified as the chemical posing the greatest threat to water quality in 25 targeted counties. As part of the corn water quality project, agents are determining the actual rate of atrazine being applied to corn and will track the application rates for several years.

Animal waste management: Poultry has been identified as the animal unit posing the greatest threat to water quality in 10 targeted counties. A statewide in-service training program was held to train agents about practices resulting in holding animal waste residue to an acceptable level. Ten agents are working to document application rates of manure being applied to field crops and animal units in the targeted counties.

South Carolina has two USDA-Extension Service Hydrologic Unit Areas (HUA) that are implementing special educational programs to reduce nonpoint source pollution. The Lake Murray HUA has highlighted the use of a new interseeder to reduce nutrient and pesticide runoff from fields. Extension, working with the Soil Conservation Service, is documenting the effects of interseeding crops on erodible lands through demonstration plots. The Lake Bowen HUA is conducting an extensive integrated crop management program on peaches to document the effects of reducing application rates of nutrients and pesticides on fruit production.

In the commercial animal agriculture areas, the aquaculture program has continued to make major advances in the past year. The 4-H catfish cage project reached 75 participants. The low-income catfish cage project in association with S.C. State University finished its second year and assisted 31 low-income farmers.

A sensory evaluation workshop to determine off-flavoring catfish was attended by 90 percent of the growers in South Carolina.

During the year extension agents reported 4,384 cattlemen attended meetings pertaining to beef reproduction. More than 1,000 cattle producers visited county offices requesting specific information on beef cattle expected progeny difference and how to use these measurable traits. Extension agents also reported that 3,744 producer's requested general types of information about beef management, nutrition, forages and records.

Clemson Extension personnel presented information to dairy producer groups, industry and political groups. Dairy extension programs were conducted on production and financial records. The increase use of DHI records has enabled dairy farmers in the state to better manage their herds. Beginning in July 1993, the maximum allowable somatic cell count has been reduced from 1,000,000 to 750,000/ml of milk. Repeat violators will have their permits suspended. Clemson University extension dairy personnel, taking the lead educational role in the national Milk Quality Assurance Program, reached 25 producers.

S.C.'s horse industry continues to grow in numbers as well as sophistication. Horses consume more than 10,000 bales of high quality hay annually in South Carolina, so quality hay has become an excellent cash crop throughout the state.

Researchers made considerable strides in understanding fescue toxicity in the pregnant mare. Transferring this knowledge to the mare owner has decreased the losses from this problem significantly. The Garrison arena continues to host many horse events.

Improving housing and ventilation for commercial poultry producers continues to be an emphasis area. A multimedia demonstration on correct management practices is being developed based on data collected from a demonstration farm project funded by the governor's energy office. This project is focusing on a computer-based environmental control system which monitors inside and outside conditions in the houses and will enhance performance while saving energy. To increase the knowledge of producers on proper management, several presentations were made to poultry producers on improving ventilation in commercial facilities.

With increased concern for the environmental impact of agriculture on the environment, the poultry science program is working with producers to improve waste management practices at their poultry facilities. Educational materials and on-farm demonstrations have been designed to assist producers with the transition from pit to composting for disposal of the normal bird mortality.

General information on poultry health and nutrition still is in demand by producers. There has been considerable interest in the raising of ostriches, rheas and emus. A package of information has been developed and mailed on request. Meetings and seminars have been held to increase the knowledge of extension personnel about this new industry.

Swine production in South Carolina is the fastest growing of all agricultural industries. Expansion will result in more than 750,000 pigs being marketed in 1995 and probably in excess of 900,000 pigs by 1996.

Carcass quality and volume demand will continue to put pressure on the traditional two to 50 sow production units. Prices will be weak in 1995 and compound the small farm producers problems. A very large number of remaining small farm swine units will close in 1995.

Clemson Extension Service emphasis placed on herd health programs, genetic quality and low energy housing for swine has helped the growth of aggressive farmers.

In the agronomic crop area, many cotton farmers have trouble maintaining acceptable levels of profit from year to year. High input costs, weather variations and poor management practices contribute to wide swings in cotton yield, quality

and profit. Higher cotton profits can be achieved by educating growers on management, processing and marketing practices.

Cotton acreage harvested in South Carolina increased from 192,000 in 1992 to 198,000 in 1993. Lint yield in 1993 was 495 pounds per acre with a total state production of 204,000 bales and a value of nearly \$60 million. Nearly 100 growers were involved in utilizing plant mapping to make management decisions. County agents are stressing the importance of mapping, and two have provided field demonstrations. Educational materials and seminars were held to help growers learn about pest management.

South Carolina has approximately 1,000 cotton producers. More than 1,000 contacts were made through county, regional, state production and marketing meetings and tours.

Forages may be our most under-utilized crop resource in South Carolina. Interest in forages is increasing because many crop acres now are in the conservation reserve because of interest in sustainability, and because the search for improved profitability leads to the development of farming systems, which often call for integrated crop-livestock activities.

Extension's new hay quality training package, developed for agents in the counties, received considerable use. State specialists continued to write news articles for the S.C. Land Resources Conservation Commission newsletter and the S.C. Department of Agriculture Market Bulletin, helping to build relationships between extension and sister agencies in the state.

A multifaceted program to reduce maleic hydrazide (MH) residue in tobacco has been conducted. Much of the educational effort is focused on using improved sucker control programs that insure season-long sucker control with reasonable MH levels. These efforts include on-farm tests, a special grower sampling program in two counties and involvement in a regional growth regulator research project. MH residues have decreased from 214 ppm in 1990 to 131 ppm in 1993, based on stabilization samples. Reducing MH residues in cured tobacco will help insure a continued strong export market.

Efforts to reduce unripe and immature tobacco being offered for sale also have proven productive. Major efforts, including on-farm tests, to reduce nitrogen fertilizer usage to recommended levels have resulted in improved quality of cured leaf.

In the commercial horticultural crop area, 11 meetings at county, regional and national levels were conducted to advise growers of new technology and industry problems. These meetings focused on apple and peach production and discussed new worker protection standards, airblast sprayer calibration and pesticide safety issues. Several meetings were held on small fruit production, disease and insect management in small fruits and disease and insect management in strawberries.

Weather stations to provide data input for computer decision aides for fruit production now are in operation. A change in grower attitudes toward using electronic technology in day-to-day decisions is occurring. The concept of a subscription fruit newsletter for growers and industry stakeholders was tested. Integrated pest management recommendations as spray guides were published after having missed a year due to budget reasons. Specific pest management strategies were updated in the *Agricultural Chemicals Handbook*.

For turfgrass, current insect, disease and weed management recommendations are published annually. All turfgrass insect, disease and weed control recommendations are reviewed and updated annually in the *Agricultural Chemicals Handbook* which is the primary publication for turfgrass insect management. The impact of this information is that turfgrass commercial producers, managers and home lawn owners are provided with recommendations that are appropriate and legal for the pest complex attacking turfgrass in South Carolina.

Intensive in-service training on basic home lawn production and management and general turf pest management was provided to 18 agents.

A survey of pesticide use on golf courses in South Carolina is finished and answers many of the environmental questions concerning superintendents about chemicals and the environment.

Golf course superintendents and one sod farmer have adopted the use of sub-surface application of nematicides for control of nematodes. Although efficacy is not greatly enhanced or reduced by subsurface placement, the potential for runoff into ponds and reduction of objectionable odors has prompted the adoption of this technique.

Many new vegetable crop growers begin operation with very limited skills. To successfully compete in a highly competitive market, these growers must rapidly improve their production skills. Older established growers must change their practices as the loss of registered pesticides and environmental concerns mandate a change to a more sustainable type of production. In most cases this requires an increase in management skills.

Extension programming is attempting to improve management skills of vegetable growers through the use of the integrated pest management concept and more efficient use of fertilizers and natural resources.

In recent years extension programming has been successful in assisting growers in adopting these techniques. All large-scale tomato growers now are using these techniques. The adoption of these techniques by growers has occurred primarily because of extension programming efforts. The emphasis on applying pesticides when needed rather than on a calendar basis has greatly reduced the use of pesticide applications from seven per season to three. Smaller growers have been slow to adopt these techniques, but because of extension demonstrations and guidance from agents, this is rapidly changing.

Drip irrigation and fertigation are widely used in cantaloupe production and are gradually gaining acceptance in watermelon production. Adoption of these techniques by growers has reduced the use of irrigation water by more than 50 percent while reducing the amount of nitrates that are leached into the ground water.

Extension programs in agricultural economics focused on four key areas: increasing profits from farm products in South Carolina, making S.C. agriculture more competitive relative to other U.S. regions and in international markets, predicting effects of U.S. government fiscal, monetary and farm policy programs on S.C. agriculture and rural areas and making energy-efficient and environmentally safe use of natural resources such as wetlands.

Small-scale farmers and families more effectively employ available resources by identifying and using alternative opportunities. More than 1,500 farmers participated in specific small-scale farm educational programs. More than 500 small-scale producers participated in tours and demonstrations of production and management practices on farms and in area tours. Revised or new publications were used by more than 3,200 small-scale farmers. A Small Farm Field Day held at Edisto Research and Education Center attracted about 1,000 people.

Clemson extended services to Polish extension agents and bankers. More than 25 workshops were conducted for Polish extension staff, farmers and agricultural school teachers. Topics included financial management, farm management and marketing.

Farm safety specialists conducted a series of six agricultural safety and leadership education workshops at the Pee Dee Research and Education Center in cooperation with the Kellogg Foundation and the S.C. Farm Bureau.

The workshops provided information on agricultural illnesses, agromedicine, farm shop safety, farm machinery safety and general agricultural safety.

Extension's food science program focused on activities to enhance competitiveness through adherence to good manufacturing practices, adoption of total quality management procedures and optimization of processing efficiencies. Accomplishments for the year included delivery of 11 multiday training short courses or workshops and 27 lectures attended by more than 2,000 employees and managers of about 225 in-state and 200 national companies on methodologies of statistical process control, total quality management, ISO 9000 and good manufacturing practices.

Extension food scientists also conducted more than 65 on-site advisories for 25 S.C. firms to promote the adoption of improved food processing practices, develop new products and/or packaging technologies. The adoption of advisories by several state firms led to the market introduction of two barbecue sauces, a line of cookies, chili and several salsa products.

Extension food science faculty also prepared and delivered 29 problem-solving analysis reports used by clients to correct specific product, processing and/or packaging problems to improve processing efficiencies and shelf-life quality. Additionally they provided 817 informal educational advisory (other than on-site) responses for information requested from food processors/extension offices/agencies/citizens on aspects of food safety, quality, preservation, packaging, labeling or processing.

Food scientists prepared and published four extension bulletins plus seven technical journal articles as references to promote the adoption of quality management methodologies, compliance with new food labeling regulations and to enhance international trade competitiveness. In addition, a 150-page technical short course manual covering 16 areas of examination for certification in the sterilization of acidified and low-acid foods was translated into Spanish for the training of hispanic speaking employees working in the commercial canning industry.

In the area of home grounds and gardens, programs were developed to educate professionals in the establishment and maintenance of landscapes, fruit/vegetable gardens and lawns. Some programs included classroom presentations, workshops, hands-on demonstrations such as fruit and ornamental shrub/tree pruning, newsletters, newspaper articles, tours, news media releases and publications.

Programs also were developed to help extension trained Master Gardener volunteers deliver extension information. Besides responding to telephone calls and office visits, Master Gardeners conducted classroom presentations and hands-on demonstrations/garden clinics, prepared newspaper articles, radio and television programs, and held various workshops at local home and garden centers.

Integrated Pest Management was used by 1,000 farmers. Field studies on seasonal abundance of aphid species in relation to virus symptoms have resulted in an improved management system for barley yellow dwarf in wheat. A trap-crossing system for suppression of stinkbugs has been transferred to South Carolina from Georgia and Louisiana. Integration of goats with cattle was demonstrated as a successful strategy for suppressing difficult-to-control pasture weeds.

All commercial tomato producers in the coastal region of the state participated in a grower-funded IPM program this year. Tomato growers have reduced pesticide use by an estimated 30 percent since 1982.

The S.C. Extension Pesticide Impact Assessment Program responds to requests from the National Agricultural Pesticide Impact Assessment Program related to EPA regulatory actions on pesticides and carries out pesticide-use surveys for important commodities in the state.

Pesticide Information Program finished studies on fresh market strawberries, peanuts, watermelons, peaches, greens, Christmas trees, sweet potatoes, turf, wheat and apples. These surveys are designed to collect pesticide use/benefit infor-

mation under special review by the EPA, or other similar regulatory action. They will be available to the growers of these commodities and general public.

The Extension Pesticide Applicator Training program is the extension training that supports the state's certification and recertification program for all sellers and users of restricted-use pesticides in South Carolina. The program reached 1,569 pesticide applicators who are farmers and commercial and noncommercial pesticide applicators. The goal of the program is to protect the public and the environment from pesticide misuse. Other programs offered are the Master Termite Technician Program, Private Pesticide Applicator Recertification and Aerial Applicators certification/recertification.

During the past year the Agricultural Service Laboratory (ASL) analyzed 31,554 soil samples, 2,311 plant samples, 329 irrigation water samples and 177 manure and waste samples.

Agricultural Service Laboratory worked with 15 county agents to provide educational programs that reached 500 farmers regarding soil fertility, liming or land application of animal waste. A nutrient management balance worksheet was created to assist farmers and ASCS to document their use of best management practices.

The lab also worked with the S.C. Department of Health and Environment Control to develop guidelines for sound land application rates of solid wastes, wastewater and metropolitan and industrial sludge.

Currently, the lab is addressing programming needs to overhaul its archaic computer information system and limited capabilities. A committee was formed to assess the need for new hardware, software and programming to make the lab more useful and efficient.

More than 5,000 individual contacts were made, providing information on beneficial and harmful insects and fungi. Most of the contacts on insects were made in direct response to inquiries of extension personnel. The *Agricultural Chemicals Handbook* and the *Garden Insect ID and Control Guide* were revised. Numerous presentations were made by agents and specialists at county, regional and statewide meetings.

Termites are highly destructive pests. The Termite Technician Training Facility at the Sandhill REC continues to improve the technical abilities of those in the termite control business. Hands-on instruction using the nationally recognized prototype training facility established at the Sandhill Research and Education Center has significantly improved the qualifications of technicians who have received the training.

For beekeepers, agents and specialists offered beekeeping training, conducted field days, assisted local residents with bee swarms and provided information for students. More than 1,000 contacts were made on bee-related matters by extension personnel.

Programs were held on shiitake and exotic mushroom production. The number of mushroom producers in the state is growing slowly. There is interest in producing mushrooms on artificial logs, and we now have a producer of artificial logs.

Forest resources faculty concentrated heavily on training professionals during the past year through 17 meetings/seminars reaching 623 forest management professionals and 946 professionals in urban forestry training. Most of the seminars were coordinated through the Extension Forest Resources (FORCE) program and covered forest resource management. The education program has been well received. It enables professionals to stay current with changes in the field and better serve the forest landowners in South Carolina.

Forestry Landowner Field Day was held at Harry Daniel Human Development Center. Extension forest resources is actively cooperating with S.C. State Univer-

sity to develop various demonstration and educational projects on the Camp Harry Daniel property. A project currently is under way using an EPA grant to highlight the best forest management practices and wetland protection in the state.

The emphasis on urban and community forestry continues to expand. Arborist certification workshops and examinations were developed.

Extension forestry personnel worked closely with the Teaching KATE (Kids About The Environment) program this year. More than 8,000 students have participated in Teaching KATE. In addition to the Teaching Kate program, in-school presentations were made to more than 600 elementary and middle school students.

Through its Marine Extension Program (MEP), extension has delivered educational programs to foster awareness of the need to promote positive actions to ensure the sustainability of coastal natural resources.

In cooperation with WCSC-TV a monthly segment on the Midday show is aired and reaches 50,000 households from Charleston to Myrtle Beach, Beaufort and Columbia. The program provides educational information on a broad range of marine and coastal topics.

The S.C. Marine Extension Program (SCMEP) has been active in the planning and organization of the Beach Sweep/River Sweep program. It is an annual event that utilizes volunteers who collected 79 tons of debris from S.C. coasts and rivers.

A 4-H marine science camp for children ages 9 to 14 was held to help stimulate interest and enthusiasm in science. This year a special camp for disadvantaged children was held at the Penn Center on St. Helena Island.

SCMEP has been instrumental in the establishment of a citizen volunteer water quality monitoring effort which began in the Charleston harbor area and now is spreading throughout the coast. There are 60 volunteers trained as water quality monitors.

Estimated dollar loss reported by S.C. agricultural producers due to deer was \$52.4 million annually. The total number of acres affected by deer crop depredation is more than one million. The Clemson Extension wildlife program focused on alternatives to reduce deer damage has included county programs, landowner visits, demonstrations, field days and phone calls on reducing damage.

Projects during the year included an ongoing community-based project in Jasper and Hampton counties to reduce deer density, a soybean browsing study, testing resistant varieties of soybeans, and publications and videos detailing alternatives that are available to reduce crop and other damage caused by deer.

Community Development

Changing life styles, the economic base, community size and subsequent demand on services in South Carolina require extensive community development support. Therefore, Extension Community Development has shifted emphasis from a narrow focus on leadership training to broader applications of public issues education.

During the past five years community development's premier program has been Palmetto Leadership. Palmetto Leadership was funded until 1993 by the W.K. Kellogg Foundation, the state of South Carolina through the Extension Service, and selected local governments and other community-based sponsors. With the conclusion of funding from the foundation and selected local agencies, Extension Service recognized the value of maintaining quality programs in community development and continued support.

Palmetto Leadership provides training on leadership skills, team building, strategic planning, conflict management, public issues education and related subjects to 20 counties. Partnerships and co-partnerships between Extension Service and local

and state agencies have resulted in modifications and adaptations of the original program to conform to the interests and objectives of the collaborating partners.

At the state level, the S.C. Department of Education, the school districts and public schools in each county, the extension office in each county and the Clemson University College of Education are partners to promote working relationships between schools, parents and service providers to families at the community level. The Extension Education Project has sites in Williamsburg, Chester and Greenville counties and draws heavily on community and leadership development expertise located in the extension office and in the county.

Community Leadership Development

All Palmetto Leadership participants form task forces which address community and local needs. Teenage participants gain leadership skills and a greater understanding of local government structure, operation and critical issues. Community-based leadership development leads to increased skills and knowledge of leadership, communication, conflict management, strategic planning and community development among local leaders.

Training classes for adults or youth were held in Pickens, Chester, Williamsburg, Marion, Jasper, York and Beaufort counties. Community Leadership Development reached 16,210 people, 35 percent being African American.

An adapted version of Palmetto Leadership was used to provide team building training which focused on communication skills, self-understanding, conflict management and coping with change techniques for the Catawba Indian Nation and Daufuskie Island residents.

Other leadership development activities include a senior leadership program designed to provide retired citizens with an opportunity to become more integrated into the greater community. Junior leadership programs offered high school students an opportunity to become more involved in community projects or improve their awareness and appreciation of governmental and private sector organizations and institutions.

Economic Development

Seminars led by University faculty, state and regional agencies, and private sector speakers supplied 2,858 participants with information and data on alternative models for community and economic development.

Palmetto Leadership was instrumental in helping Jasper County complete its road naming project, and Chester County hired a 911 coordinator and has completed approximately 25 percent of its road naming project.

A collaborative activity involving the Clarendon County Chamber of Commerce and extension resulted in two full-day retreats for 34 county leaders who saw a need for broad-based strategic planning and team building.

Marion County leaders participated in a special team building effort designed to remove obstacles that affect sustained economic development in remote areas of the county.

The Tourism Development Task Force in Pickens County once again had a grant proposal funded to place a visitors center on scenic Highway 11 to attract tourism to the area.

Darlington 2003, formerly known as DC 2020, is a major economic development strategic planning and vision process which has relied on the expertise and experience of extension community development professionals. This is a collaborative effort which involves the Chamber of Commerce, the Economic Development Commission and the County Council with support from Clemson Extension. Their combined activity has resulted in a blue print for economic development which begins this year and carries into the next decade.

Local Government and Services

Palmetto Leadership and Community Development program is extension's primary instrument to provide local government officials with educational and technical resources. Using task force committees, agents and specialists reached 4,784 people.

Sixteen thousand community leaders receive the *Community and Economic Development Newsletter* quarterly from the Strom Thurmond Institute, which is funded by the Extension Community Development. Faculty and resources are shared by the institute and extension to meet the special needs of local officials and their constituencies.

Quality of Life

Planning for environmental issues education has undergone the greatest proposed overhaul during the past year. State and county-based strategic planning efforts identified current strengths, weaknesses, opportunities and challenges in the quality of life category. The subject area is environmental education with special emphasis on solid waste management and water quality protection education. Plans call for in-depth education at the local level in FY '94-95. Implementation of the lead agent concept is likely to become the refocus vehicle for this effort.

S.C. county leaders learned about local issues and public policies on such matters as solid waste management, recycling, improved educational achievement, recreation, housing, health care and safety. A Master Waste Educator program was offered. Waste Management reached 38,903 people. Water quality issues were addressed with 16,003 people. Contacts with 23,698 residents were made by agents and specialists under Quality of Life.

Palmetto Leadership task forces initiated the first Homework Center's programs in conjunction with the Children's Trust Fund, Duke Power Company and local leaders for elementary school children and operates in 13 counties. Extension Community Development has relinquished managerial control and sponsorship to the Department of Family and Youth Development which continued partnership with funding agencies. Relocating the program illustrates the community development theme of teaching empowerment and letting go.

Family and Youth Development

S.C.'s populace – as anywhere – faces death, injury, birth of children, illness, marriage, divorce, career and other changes throughout their lives that require adaptations in life styles. Assistance is needed to help them cope with life's transitions. Many youth have experienced a rising incidence of crime or violence in their neighborhoods, homes or schools. Adults and youth need assistance in career choices or re-entering the work force in economically unstable times.

Teen pregnancy continues to be a critical problem facing not only this state but the nation. In 1991, 5,200 girls in South Carolina between the ages of 14-17 became pregnant. Therefore, the need for teen pregnancy prevention programs and activities is evident. These young mothers and babies face ever-increasing odds for a healthy and productive life.

Extension continues to provide leadership in teen pregnancy prevention councils, and an interdisciplinary coalition which comprises representatives from public and private youth-serving organizations continues to address this issue. Extension served as one of the lead agencies in planning, conducting and evaluating a statewide conference which targeted increased awareness of teen pregnancy and strategies to reduce at-risk behavior of teens. Through collaborations with other agencies, organizations and groups, programs were implemented focusing on

building self-esteem, coping with peer pressure, communication skills and making responsible decisions.

Stressful situations affect all segments of the population. Last year, nearly 1,000 youth and adults participated in programs offered through extension that emphasized coping strategies. Educational materials on stress and coping were provided to more than 38,500 people via radio, television, newsletters and newspaper articles. Conflict resolution will be emphasized in the coming year.

Extension is emerging as a leader in parent education. Parenting coalitions have been formed in several counties, and a \$150,000 grant was awarded in Cherokee County to build collaborative parenting programs. In addition, extension personnel have provided training to statewide agency personnel who then deliver parenting education material and information to Medicaid recipients.

Assisting S.C. families and youth in making wise and informed decisions as consumers continues to be the focus of extension's family resource management program effort. Unique strategies often are needed when families have limited resources or life transitions such as divorce, unemployment or personal loss. Efforts have been directed toward development of program materials and training in wills/estate planning, debt management and education needs of limited resource individuals. A career exploration program entitled "Go for the Goal" continues to be successful. Initiated five years ago, information on this program has been shared with 42 other states and the District of Columbia.

Entrepreneurial efforts continued in the "sewing as a business" project. This clothing and textiles program has assisted individuals who sew for profit in their homes to learn how to turn their skills into small home-based businesses. A videotape on pricing for profit, with special emphasis on marketing, writing a business plan, and teaching sewing were added to further assist clientele. More than 6,000 contacts have been made relating to clothing selection, stain removal and care, construction and other topics relating to clothing and textiles management. More than 200 individuals who have had mastectomies or disabilities affecting their ability to dress themselves or wear rack clothing have been assisted with special clothing needs.

Educational information was disseminated to more than 370 clientele concerning the selection, use and care of household equipment, and more than 600 citizens requested information on household management practices.

Training, using a series of lessons covering all aspects of aging, was conducted throughout the year. As the nation and the state's baby boomers age, this will become an increasingly important component of extension's educational efforts.

Federal legislation affecting nutrition labels and school lunch programs has been passed. As a result, training has been conducted throughout the year for extension agents as well as cooperating agency personnel.

Approximately 4,000 homemakers were enrolled in the adult phase of the Expanded Food and Nutrition Education program. More than 75 percent of these families participate in the food stamp program, 65 percent in WIC, and 50 percent have children who participate in the National Child Nutrition Program. All EFNEP extension agents and paraprofessionals participated in training on the services of other agencies and how to effectively make referrals. All major agencies – including DSS and DHEC – were visited by the professionals and extension coordinators in 37 counties to establish or improve collaborative efforts and referral systems.

The Family Information Network is a computerized information and referral service that offers information on dependent care for families responsible for child and elderly care. This network is available through all 46 county extension offices in the state and reached nearly 40,000 persons last year.

The 4-H youth development program reached more than 60,000 young people, ages 5-19. Efforts in youth development are multifaceted. S.C. teens are faced with

critical decisions regarding career choices and economic challenges currently threatening or limiting their future job potential. Career workshops and programs have been conducted in schools and through special interest 4-H Clubs and groups. Four major high school assemblies hosted career workshops to address some of these issues. More such programs are planned in the coming year.

We live in an expanding community and that fact is acknowledged in the 4-H pledge which ends with "...and my world." Therefore, youth are provided access to 4-H cultural and international education programs that will enable them to gain knowledge and develop appropriate skills to survive and achieve in the world community. During the past year, 1,164 individuals reported an increase in knowledge related to cultural and international topics. Some 183 presentations were made on cultural and international topics, and 65 youth participated in cultural and international programs.

More than 100 teachers in three school districts in Sumter County participated in a one-day workshop entitled "Project LOVE" (Learning Opportunities to Value Each other). South Carolina hosted an IFYE (International Foreign Youth Exchange) delegate from Oxfordshire, England, and enabled a former 4-H'er to be an IFYE delegate to Costa Rica, Central America. Also, in-service training on cultural and international education was made available to county extension faculty through the instructional television classroom to seven field sites, and an electronic newsletter was created with four issues distributed to county faculty.

Annually, a Citizenship-Washington Focus Conference is held in Washington where participants attend workshops, interact with congressional aides and gain an understanding and appreciation of how their individual actions can make a difference, their responsibilities in civic affairs, government operations and current issues. This past year, six youth attended the conference in Washington, and more than 2,000 teens involved in the 4-H Citizenship project participated in workshops, lectures and programs in schools or community leadership workshops statewide.

A major aspect of the 4-H Food and Nutrition program is to teach youth proper food buying skills, along with sound nutrition principles. Programs conducted by extension agents, EFNEP Program Assistants and volunteer leaders reached more than 5,000 youth during the past year.

4-H animal projects continue to have strong participation. Through these programs, youth develop knowledge and skills in feeding and care of domesticated animals, and adult volunteers receive training to enable them to enhance youth participants' experiences. Traditional animal and poultry programs such as shows, judging competition, fairs and clinics are a traditional part of S.C. 4-H.

Efforts in health education included the 4-H radon project which continued in 12 target counties selected as pilot counties in this effort. Students in grades 5-8 who were enrolled in health or science classes in selected elementary, middle or junior high schools learned about the hazards of radon gas and were encouraged to share information with others.

The development of essential life skills is imperative as we approach the 21st century. There is an urgent need for adults and youth to learn and develop necessary life skills to prepare them to deal with everyday living. In South Carolina, nearly 400 adults and 3,000 youth report having improved life skills through participation in activities or programs sponsored by the Cooperative Extension Service. For the fourth straight year, training for youth and adults was provided as a result of a national grant designated for providing life skills for youth in rural areas.

Natural resources continues to be an important aspect of youth development. Teaching KATE – an on-site environmental program for children coordinated by a natural resource coalition and offered through our two 4-H Leadership Centers – reached more than 4,000 school age children. This program teaches environmental

stewardship and is an addition to the 4-H camping program which reaches more than 6,000 young people annually.

Adult volunteer leadership is emphasized through 4-H volunteer leaders, Family Community Leadership and the S.C. Association of Family and Community Education. Leadership development, public policy education, family issues (children and elderly), the environment (waste management) and global issues are part of an ongoing focus of these groups. More than 325 individuals participated in Family Community Leadership training in the past year.

The 4-H PEAK (Professional Educators' Access to Knowledge) project was kicked off during the past year and was very successful. This effort's primary objective is to offer training, skills, support for school teachers to offer an expanded science and technology curriculum for youth statewide. The program has received national recognition and is well under way for a second year.

DIVISION OF REGULATORY AND PUBLIC SERVICE PROGRAMS

The Division of Regulatory and Public Service Programs, formed in 1970, comprises the director's office and four departments: Fertilizer and Pesticide Control, Plant Industry, Seed Certification and a portion of Agricultural Chemical Services.

The division's mission is to enhance the quality of life, agriculture, environment and dwelling for South Carolinians by ensuring compliance by regulated industries and individuals with federal and state legislative mandates.

Our programs promote the use of certified seed and plants; provide the services needed for certification of crop plants; assure that fertilizers, lime, pesticides and seed meet the standards to produce marketable, safe and profitable crops; provide inspections to monitor pesticide treatments by pesticide applicators; regulate the structural pest control industry; and monitor antisiphon devices on farm/nursery/turf irrigation systems that supply pesticides and/or fertilizers along with water.

We also provide inspections to assist the state's plant industry in certifying plant material and agricultural commodities to be apparently pest free; maintain the honey bee health of the state through eradication, quarantines, regulatory treatments and permitting; eradicate noxious plant pests such as the cotton boll weevil and the parasitic witchweed from the state; and ensure that abandoned fruit orchards do not become a menace to nearby producing orchards.

The following activities, by department, highlight the division's work for FY '93-94.

Department of Agricultural Chemical Services

This department performs the chemical analyses reported by the Department of Fertilizer and Pesticide Control.

Laboratory chemists analyzed 821 pesticide residue samples, 355 pesticide formulation samples and screened 206 groundwater samples for more than 50 pesticides. The department also conducted analytical procedures on 3,299 fertilizer and 199 lime samples, most of which required multiple analyses.

The department performed 17,910 analyses for the S.C. Agricultural Experiment Station. The Agricultural Service Laboratory processed 32,865 soil samples,

5,446 nematode samples, 2,852 feed samples, 2,324 plant samples, 329 irrigation water samples and 177 manure samples.

Department of Plant Industry

The mission of the department is to prevent the introduction and spread of plant and honey bee pests into, within, and from South Carolina through plant pest exclusion, quarantines and eradication; plant export certification; honey bee pest exclusion; nursery, greenhouse and transplant certification; boll weevil eradication and elimination of abandoned orchards. This mission is directed by a number of laws and regulations.

Plant Industry continued to work with the nursery, greenhouse and vegetable transplant growers to render efficient and effective service whereby plant material could be shipped intrastate, interstate and international. Upon request, special inspections were conducted for several establishments to meet Canadian requirements for Japanese beetle.

Plant Industry specialists issued 254 state phytosanitary certificates for plant material exported to 30 foreign countries, U.S. possessions and other states. Inspections also were conducted for homeowners, tobacco transplant growers and sweet potato growers to certify freedom from plant pests whereby products could be sold, distributed or shipped to other states.

Abandoned fruit orchards were checked when complaints were received. Approximately 406 acres were identified for tree removal by the owner. The phony peach disease survey program was conducted during the summer months to benefit commercial producers by identifying diseased trees for roguing. Disease incidence still is very low (.015 percent) due to this work.

The state apiary (bee) program included inspection of 108 apiaries, representing 1,426 colonies of bees. Varroa mites and tracheal mites continued to be the major cause of colony loss in the state. Africanized honey bee swarm traps were placed and monitored at high-risk locations. No Africanized honey bee swarms were caught.

Plant Industry cooperates with the USDA, Animal and Plant Health Inspection Service on several state/federal programs, namely imported fire ant, witchweed, gypsy moth and boll weevil. The fire ant occurs in all 46 counties of the state. Thus, increased contacts, visits, and inspections of nurseries, turf growers and other establishments will continue to inform, educate and assist S.C. producers to market clean, noninfested plant material.

Witchweed infested acreage now is only 6,934 acres. The small infestation in Berkeley County was eradicated, and the county has been released from quarantine. Three counties, Marion, Horry and Dillon remain with infested acreage.

Surveyors installed 1,422 gypsy moth survey traps throughout the state in 1993. A total of 45 traps caught 58 adult male moths. Seven moths with Asian markers were trapped in the Little River area (Horry County) during 1994. Pesticide treatments are a possibility in spring 1995.

The boll weevil eradication program continues to be successful. Only four boll weevils were caught statewide in 1993. The growers per acre assessment rate in 1994 is \$2.50 compared with \$3.50 last year. Grower cost continues to decrease as cotton acreage increases.

Seed Certification

Seed certification is a program of standards imposed on the seed and plant production industries that ensures varietal purity, good germination and freedom from noxious weed seeds. Participation in the program is voluntary.

In 1945 the General Assembly designated Clemson as the agency to inaugurate and carry out a program of certification of pure seed and plants.

Department field work in FY '93-94 involved inspections of 24,111 acres of crops for certified seed production. Inspections included 72 varieties of 14 crops for 101 farmer/growers and 28 seed-producing firms. Inspectors checked each field to determine that the crop was true to variety and free of noxious weeds and seed-borne diseases.

Acreages of major crops inspected were: soybeans, 11,715; small grains, 10,135; cotton, 1,148; peanuts, 531; grasses 327; and pine trees, 246. Other field work included grow-out plantings of 528 samples representing 264 lots of S.C. certified soybean and small grain seed to verify proper sampling and labeling.

During FY '93-94 the department issued 409,263 certified tags and approved 201,803 certified bags with preprinted labels for growers whose seed met standards in the field and laboratory. Department inspectors examined and approved 20 seed conditioning plants for custom conditioning of S.C. certified seed during the year.

Department of Fertilizer and Pesticide Control

The Department of Fertilizer and Pesticide Control is responsible for education and enforcement of the provisions of a number of laws and regulations. The S.C. Fertilizer Law and the Liming Materials Act primarily are designed to ensure that consumers receive high quality fertilizer and lime. The Pesticide Act regulates pesticide storage, sale and use plus such areas as quality of manufacturers' production and all aspects of pesticide and structural pest control.

Some of the major activities of this department relative to fertilizer and lime from July 2, 1993 to June 30, 1994 follows:

Fertilizer tons sold	573,905
Fertilizer samples procured and analyzed	3,266
Fertilizer samples not meeting guarantee	361
Lime material and samples procured and analyzed	194
Total number of liming material samples not meeting guarantee	26
Percent of liming material samples deficient	13.4
Fertilizer registration fees collected, payable to state treasurer**	31,270.00
Lime registration fees collected, payable to state treasurer**	400.00
Lime permit fees collected, payable to state treasurer**	1,850.00
Fertilizer taxes sent to state treasurer**	143,819.28
Soil amendment registration fees **	400.00
Soil amendment inspection fees**	11,136.80

**Actually recorded by state treasurer July 1, 1993-June 30, 1994, but may not correspond to final fees paid for the fiscal year.

The fertilizer tonnage sold this year increased by 6.6 percent from FY '92-93. Overall 11.1 percent of fertilizer samples did not meet the guarantees within the investigational allowances. Other than deficiencies, the greatest problem in the fertilizer and lime areas continues to be the lack of proper labeling of bulk material.

The S.C. Pesticide Control Act mandates quality control monitoring and regulates the sale, use and application of all pesticides used in South Carolina. This department uses a strong preventive violation/education program coupled with fair enforcement actions to help ensure productivity while preventing adverse effects on man or the environment.

To improve its education and enforcement capabilities, the department has pursued external funding without decreasing the flexibility of the pesticide program. These efforts have resulted in a \$624,000 grant from EPA. The department also has made a concerted effort to increase efficiency by using state-of-the-art data management. During 1992 legislation was passed which revised pesticide registration fees and allows the department to keep all registration fees exceeding \$140,000 and PCO license fees to \$50,000. All other fees are sent to the state treasurer.

In FY '93-94, 865 companies registered 7,560 pesticide products for sale in South Carolina. The department collected and analyzed 346 pesticide samples. The department collected \$535,000 in registration fees.

Pesticide dealers and applicators must be certified and licensed to buy, sell or apply pesticides classified for restricted use. As of July 1, 1994, the number of applicators licensed were: 14,086 private applicators licenses, 2,430 commercial applicators licenses, 786 noncommercial licenses and 339 pesticide dealers licenses. Certification fees collected total \$61,622. Business license fees totaled \$57,834 for 709 business companies.

In the area of education and enforcement, the department's specialists made frequent contact with pesticide users, including dealers, growers, applicators and consumers. The structural pest control area requires particular attention. The Pesticide Act was amended to increase the insurance/bond requirement to become licensed as a commercial applicator.

Enforcement actions against violators were decisive but fair. As part of the EPA/Department of Fertilizer and Pesticide Control Cooperative Enforcement Grant, the department made 113 marketplace inspections and 379 restricted use pesticide dealer inspections.

The department levied 66 civil penalties ranging from \$250 to \$3,500 and totaling \$20,350. Investigators pursued 1,309 cases of potential pesticide misuse, complaint or noncompliance with regulations. They issued numerous stop-sale notices for unregistered products, sale of restricted products by unlicensed dealers and other alleged violations. The department issued warning letters in 228 cases. Overall compliance with the act by members of the agribusiness industry has been excellent.

LIVESTOCK-POULTRY HEALTH DIVISION

The Livestock-Poultry Health Division conducts a number of regulatory programs in consumer protection, animal health and the diagnosis of various diseases in S.C. livestock. Its programs protect both the human and the animal population of the state.

The division's three main responsibilities are the administration of the Animal Health Programs, the Animal Diagnostic Laboratory and the S.C. Meat and Poultry Inspection Programs.

Animal Health Programs

The Livestock and Poultry Health Programs provide protection to the human population as well as to animals.

A major public health role is provided by this division through many animal health programs which have virtually eliminated numerous zoonotic diseases. We continue to furnish surveillance on brucellosis, tuberculosis, equine encephalomyelitis and other diseases contagious to man.

We currently administer very successful programs in control and eradication of pseudorabies and equine infectious anemia. We also provide surveillance for the entry of foreign animal diseases. This division also is responsible for the enforcement of our animal health laws and regulations.

Animal Diagnostic Laboratory

Improved service, teaching, and collaborative research characterized the efforts of the Clemson Animal Diagnostic Laboratory during FY '93-94. During the year in excess of 22,000 cases were handled by the laboratory. This figure includes approximately 1,400 bacterial culture and sensitivities, 1,200 post-mortem examinations, 1,700 histopath and cytologic examinations and 12,000 Coggins tests for equine infectious anemia. In addition 18,000 swine blood samples were tested for pseudorabies virus.

Laboratory veterinarians are involved in teaching poultry diseases and animal pathology to Clemson University students. Seminars on animal diseases were presented to local veterinary associations and to animal producers and owners during FY '93-94. Collaborative research on *Helicobacter pylori*, a major cause of gastric ulcers in man, was conducted with the Greenville Hospital System/Clemson University Cooperative Research and Education Program in 1993 and 1994.

Meat and Poultry Inspection

The S.C. Meat and Poultry Inspection Department is a public health regulatory agency responsible for enforcement of two state laws concerning the safety, wholesomeness, packaging and labeling of meat and poultry products.

The state inspection program is a science-based program which utilizes food microbiology, food chemistry and histopathology to augment traditional organoleptic inspection techniques.

The inspection department is committed to an intensive ongoing formal training program to upgrade the skills and knowledge of all inspection personnel.

COLLEGE OF FOREST AND RECREATION RESOURCES

Founded in 1970, the College of Forest and Recreation Resources is dedicated to meeting the needs of South Carolina, the nation and our global community through aggressive education, research and extension programs for the wise management of our natural resources and for enhancing the quality of life for our citizens. This mission is carried out by our constituent departments and institutes of

forest resources; parks, recreation and tourism management; aquaculture, fisheries and wildlife; the Archbold Tropical Research Center; The Belle W. Baruch Forest Science Institute; and the Recreation, Travel and Tourism Institute.

Our college programs extend beyond our students and industry groups and directly touch the lives of S.C.'s citizens through program areas such as the PRTM Outdoor Laboratory, which is recognized by its peers as the finest university facility of its type nationwide. For example, the Outdoor Laboratory has various resident camps: Camp Sertoma (hearing impaired and disadvantaged youths), Camp Hope (mentally retarded and emotionally disturbed citizens), Camp Lions Den (visually impaired youths) and Camp Running Brave (hemophiliacs). Through these camps, the Outdoor Laboratory strives to improve the quality of life of these very special people and their families. Our Extension forest resources offices serve every county of the state with special needs of that county and region. The Belle W. Baruch Forest Science Institute on a 17,500 acre tract in Georgetown, S.C., is dedicated to research and education in forestry in the coastal plain areas of the state. Our college also has a well-respected continuing education effort. For example, we are a primary training site for the U.S. Forest Service short courses in silviculture, harvesting and sales layout, recreation and various computer-based applications.

Our college's pursuit of excellence extends beyond our state. With the establishment of the Archbold Tropical Research Center on the island of Dominica in 1989, our scientists and students have the opportunity to work with the Caribbean, Central American and South American cultures and governments to provide leadership and expertise in various fields of study. Due to our work through the Archbold Tropical Research Center, we are attracting students and faculty from around the world.

The college has also strived to keep abreast of the changes in computer technologies. With state-of-the-art facilities in Geographical Information Systems (GIS) and P.C. laboratories, our college has opened new teaching and research opportunities for our faculty and students.

Department of Forest Resources

The Department of Forest Resources' programs in education, research and extension are unique within the state. The department plays an important role in educating new and practicing forest resource managers. During the past academic year, 28 B.S. degrees, 14 M.S. degrees and four Ph.D. degrees were awarded. The program currently has 214 undergraduate students and 57 graduate students, which is up from 160 undergraduate and 50 graduate students during the preceding academic year.

Many faculty were actively engaged in research, and more than \$571,000 in external support was generated for our research and outreach programs. Three research areas have been identified for particular emphasis within the department: ecological forest management, forested wetlands management and science, and improved utilization of southern pine juvenile wood.

Extension forest resources continues to support forest landowners through formal, local programs, especially those organized through county agents and county forest landowner associations. Greater effort, however, has been directed to continuing education for professionals both in forest management and urban forestry through our Forestry Continuing Education (FORCE) program, with more than 600 forest management professionals and with more than 900 urban forestry/arboreal professionals receiving training during the past year. In turn, these well-trained professionals reach many more individuals than our Extension group alone. Additionally, more than 8,000 elementary students, and nearly 800 elemen-

tary teachers have received training in our "Teaching KATE (Kids About the Environment)" partnership.

The Baruch Forest Science Institute is moving into an expanded phase of coastal forestry research with the establishment of the Wallace F. Pate Foundation for Environmental Research and Education. First phase of fund raising was completed in September with the gift of 600 acres of coastal forest, valued at between \$9-\$12 million, for establishment of the education center. Located adjacent to the Baruch property, this land expands the research base of the institute. Institute faculty is continuing research on coastal forested wetlands with state support and grants from USDA Forest Service, USDA Competitive Grants, USDI Fish and Wildlife Service, USDOE Oak Ridge National Laboratory, USEPA, Melon Foundation, International Paper Inc., and Westvaco Corp.

Department of Parks, Recreation and Tourism Management

Teaching personnel in the Department of Parks, Recreation and Tourism Management (PRTM) are dedicated to excellence in education at the bachelor's, master's and doctoral levels.

Professional preparation by our students leads to careers in public and private leisure service agencies including: county and municipal leisure services administration; youth serving agencies; federal, state and county recreation and park resource management; therapeutic recreation program delivery systems; and, the broad field of travel and tourism management. PRTM-related careers make up a \$400 billion industry nationally and a \$7.3 billion industry in South Carolina. Furthermore, preparation at the doctoral level is directed toward research and instruction in academic settings.

Fall 1993 enrollment figures for the department comprise:

Undergraduate.....	286
Graduate	60

Highlights within PRTM's instructional program for FY '93-94 included:

- PRTM has initiated two off-campus learning opportunities: During the next three years, we will provide seven different graduate classes at six sites throughout the state through the telecampus program.
- We are offering undergraduate courses at the University Center on the Greenville Technical College campus.
- Our Rural Recreation Project is receiving national recognition for the innovative delivery system that it is establishing.
- PRTM is working with the Andrus Foundation in developing an inter-generational service program which brings senior citizens and youth-at-risk together to form service teams.
- PRTM has helped organize a statewide task force on ecotourism development which will develop a set of guidelines for entrepreneurs.
- PRTM, along with the National Center on Accessibility, Indiana University, sponsored the Third National Forum on Accessible Golf at Wild Dunes Resort, Charleston, S.C. The goal of the forum was to address programmatic issues that confront the disabled in accessing the game of golf. It included presentations from various leaders in the golf industry and individuals representing research, training and technical assistance interests.

- This year marked the 24th Annual College Week for Senior Citizens. A total of 126 senior citizens participated in the single session this year.
- Dr. Fran McGuire, faculty member, was elected centennial professor.
- Dr. Jessyna McDonald, faculty member, was awarded two postdoctoral awards; the National Research Service Award from the National Institute on Aging, and a postdoctoral fellowship by the American Gerontological Society.

Public Service/Extension

- College Week for Senior Citizens, a single week program that served nearly 200 citizens from South Carolina and the surrounding region.
- The Recreation, Travel and Tourism Institute sponsored a five-day short course on "Principles for Marketing Ecotourism" in Dominica; sponsored the first S.C. Nature-Based Development conference at Litchfield Beach; sponsored an 18-hole golf tournament as a preconference event at the S.C. Governor's Conference on Tourism and Travel to build awareness of the PRTM degree program and the institute and to provide a vehicle for PRTM students to meet industry people; and help to sponsor the Clemson Association Student Chapter of the Travel and Tourism Research Association for the travel and tourism students. The institute also created a pilot project to implement the Green Evaluations Program in Ecuador for the Ecotourism Society.
- The S.C. Rural Recreation Project served eight communities this year including Bamberg, Blackville, Catawba Reservation, Chesterfield, Edgefield, McBee, Ridge Spring and Williston. The program, which provides recreation programs and services via a local recreation director, was extremely successful; and for the fourth straight year, participation increased. Project reports indicate that 158 different programs or activities were offered in the eight communities with 11,306 in attendance.

Archbold Tropical Research Center

Clemson University received the donation of the Springfield Plantation from honorary Dr. John D. Archbold in May 1989. In response to this donation, the Archbold Tropical Research Center was created. The center functions as a teaching, research and public service consortium of leading institutions. The mission of the ATRC is to promote undergraduate and graduate education and research in tropical ecology, conservation biology, natural resources management, nature tourism, island culture and sustainable economic development.

We continue to improve the quality of the facilities for teaching and research. We have renovated the old garage building into a field laboratory and have installed a library and a herbarium in the guest house. We also have completed the renovation of one of the service buildings into a new two-bedroom cabin for visiting researchers. We completed the renovation of the two-story Stream House. It now serves as a second dormitory to Mt. Joy, allowing us to run two classes at the same time.

We also have several agroforestry and tropical agriculture demonstration plots in place for student and research use. A nature trail has been developed for the property.

Research on conservation and sustainable development in Costa Rica and Panama, funded by the U.S. Agency for International Development and the McDonald's Corp., continues to expand in scope and support.

ACADEMIC AFFAIRS

Clemson University Libraries

This annual report of the Clemson University Libraries is presented in the format of the Libraries major goals. These goals are part of the Libraries Mission/Goals and Objectives/Strategies.

Goal 1: The Libraries will improve existing and develop new services in accordance with the Libraries' Vision and Mission Statements and the University's Goals.

All areas of the Libraries were asked to choose one area for continuous improvement. Examples of the areas chosen and their results are covered below.

The Cataloging Unit chose to concentrate on the physical processing of materials as its one aspect of its services for continuous improvement this year. The improvements in workflow, staffing and equipment have begun and will be completed before the end of the calendar year.

The Circulation Unit focused on stack maintenance in the regular collection and in Reserves/Media. Improvement was achieved by: 1) increasing student hours in shelving and shelf-reading; 2) using community service students to straighten areas and dust, freeing regular students to focus on stacks maintenance; 3) providing service to disabled patrons by the current page service; 4) completing a shifting project during Christmas intercession to provide space for the collection on level one and moving the little used collection of Union Catalogs from level six where space is desperately needed; and 5) instituting a program of shelf-reading the Reserve collection.

With funds received as a part of the one-time funding program, the Libraries designed and created a PC based LAN using an Infoserver to provide access to electronic materials issued by the U.S Government Depository program. This data is transferred from CD ROM disks to hard disks managed by the Infoserver and is currently available from seven PC's in the Libraries Reference Area. Work continues to make this system accessible from the campus network, thus providing users access to the data remotely.

The Libraries, through its Reference Unit, established a Patent Searching Room which provides access to a large number of patents for the University community as well as to the citizens of South Carolina. Clemson University Libraries is now the only official patent depository in South Carolina. Efforts are being made to acquire the patent backfile from MUSC.

The Planning and Assessment Team gathered statements from the units about their customers then developed a library-wide customer statement that has been incorporated into a revised mission statement. A Noise Team, created by the Planning and Assessment Team responded to patron input concerning the excessive noise in the Cooper Library. The Noise Team analyzed the noise problem, looked at alternative solutions and implemented a plan to designate "Quiet" floors.

A major objective of the Libraries was to meet or exceed the University timetable in complying with the spirit as well as the letter of ADA. In that regard, a number of actions were taken by the various units within the Libraries toward this objective.

All of the classified staff job descriptions were reviewed and revised as necessary to bring them in accord with ADA requirements.

Two new handicapped-accessible photocopiers were purchased with Tiger Stripe machines for them, and an agreement was reached with the American Institute of Architecture students to place a Tiger Stripe only photocopy machine in the architecture labs.

Access to the lower level of the Architectural Library has been improved. The arrangement of the main level of the Architectural Library was assessed for accessibility and esthetics, and the LUIS/DORIS terminals, the circulation desk, reading room furniture were rearranged to provide better handicapped access. Metal stools were purchased to replace the heavy captain's chairs previously used at the terminals, and a new handicapped-accessible photocopier was purchased.

Circulation Services expanded the current page services, and the services in Reserves and Media; a statement was written to describe services available to the disabled customer. Circulation services provides assistance in locating materials, photocopying microforms and billing the customer.

Resource Sharing developed a mechanism to enable disabled patrons to leave and pick up ILL requests, and Copier Services created a policy incorporating help to disabled patrons as part of its regular operating procedures. This will include: 1) A request that the box on the ILL office door has been lowered to handicapped-accessible height. 2) Publicity and/or signage regarding the leaving of requests at the reference desk was generated. 3) Pick up of materials at the circulation desk has been emphasized. 4) Copier Services has created a policy and procedure statement for helping disabled students in the copier room. 5) A copier accessible to disabled patrons within the ADA guidelines has been purchased and is operational.

Goal 2: The Libraries will identify and provide timely access to available information.

A major effort this year was to improve the electronic access to information. A number of projects were completed or made substantial progress.

A proposal for a LAN/WAN to improve access to U.S. government information provided to the Libraries on CD-ROM was submitted and funded with one-time funds by the University. During the year a great deal of progress was made on the implementation of the LAN/WAN with internal networking of the two heavily used government data bases, NTDB and NESE. Work is continuing to add the components needed to make this resource accessible remotely.

Each reference librarian has promoted the use of appropriate electronic data bases, primarily through subject-specialized bibliographic instruction classes. All reference staff received training on patent searching, Internet searching and LEXIS/NEXIS searching. Instruction is ongoing.

With financial assistance from the College of Commerce and Industry, the Libraries were able not only to retain the very popular Business ProQuest system, but to expand it to two stations and to add its index, ABIInform, to the Libraries' LAN.

The Libraries' "gopher group" established a GOPHER server and a World-Wide Web server in the library and will be investigating other remote access tools. These servers allow access to electronic journals, downloading capabilities (text screen capture or record data to floppy or electronic data set), and access to remote OPACs and data bases.

The Libraries' Information Access Committee sponsored a test of FaxonFinder as a possible current awareness tool and currently is planning a similar test of UnCover. The committee will assist in the evaluation of electronic access as new services are proposed and old ones recommended for dropping. Both FaxonFinder and UnCover not only provide current awareness to the journal literature but also provide sources for article delivery for materials not housed in our libraries.

Maintenance of the Libraries' bibliographic data base was greatly advanced this year by the implementation of the global change programs, and thousands of subject headings have been updated in the NOTIS data base.

The Libraries, through its public documents unit, is entering bibliographic records for government documents into LUIS, increasing the access to this wealth of information which historically has been organized separately. This is a long-term project, but progress is being made.

Interlibrary loan borrowing turnaround time decreased from 13 days to 11 days. Borrowing transactions were up more than 25 percent, the filled rate was up to 83 percent.

In an effort to continually reduce the cost of acquiring materials from other libraries via the interlibrary loan process, the Libraries continues to establish reciprocal agreements with other libraries and groups of libraries for free interlibrary loan services. These agreements not only eliminate the cost of acquiring the materials from other libraries but also do away with the cost of processing invoices and purchase orders. The amount of money expended dropped by almost \$8,000.

To improve access to materials for M.B.A. students in Italy, Cary Wilkins from the cataloging staff went to Pordenone, Italy, to help organize and catalog a business library that is affiliated with the Clemson University M.B.A. program.

Goal 3: The Libraries will improve and maintain its collections to advance Clemson's teaching, research and service goals.

A schedule of processing levels was developed and implemented for the University Archives in 1993. Level C processing will be completed by the end of June, 1994, for the records of the Cooperative Extension Service (director and dean), Department of Forestry and School of Textiles. Level C processing will be completed for the records of the Athletic Department and IPTAY by the end of 1995.

After doing an analysis of the alternative ways for Clemson users to access the growing number of electronic, on-line journals, the Libraries have established a pointer in its GOPHER to the CICnet journals, the most complete location of electronic journals in the country.

The Libraries regular collections, while efforts continue to provide improved access, continue to fall behind the level we should be collecting due to budget restrictions and journal price increases.

Goal 4: The Libraries will develop its staff to improve the variety and quality of services.

The two faculty positions in the Architecture Library were filled early in the fiscal year, with Deborah Barlow being appointed branch head and Ann Lally as assistant reference librarian.

A major effort this year was Clemson Libraries' leadership in the review and proposal for change for the library technical assistants series job specifications. A complete review was done by an ad hoc team in the Libraries with the result being the total rewriting of the existing LTA classifications and the creation of three additional classifications. This proposal was submitted to and approved by the Library Director's Forum, a group consisting of the directors/deans of the 33 public higher education institutions. The Libraries also led the effort to have the grade levels for these classifications upgraded, however, enough institutions indicated they didn't have the needed funds and the proposal was postponed to '94-95 when it will be resubmitted.

Considerable efforts were made throughout the Libraries at cross training to create a more knowledgeable and flexible staff.

Goal 5: The Libraries will provide optimal space and facilities for users, staff, services and collections.

The largest effort in improving the facilities of the Libraries during '93-94 was the installation of mobile shelving in the Special Collections area. This was a massive effort, requiring that all of the materials housed in Special Collections be moved to storage facilities on campus while the existing shelving was dismantled and tracks and carriers were installed and the shelving reassembled. A great deal of credit goes to a number of the staff in the Libraries, particularly to Michael Kohl and the staff in Special Collections. The new mobile shelving provides room for additional materials to be housed in Special Collections. Before the installation, materials were literally stacked in boxes in the aisles.

A considerable amount of planning was done for the creation of a new facility to house the University's Records Center at an off-campus site. The Libraries facilities team, as well as the Records Center staff, have done an excellent job of developing a program for the design of a new structure. In addition to housing the University Records awaiting disposition, the facility also is programmed to provide space for the Libraries to house little-used materials, thus clearing some needed space in Cooper Library.

The facilities team also examined the potential use of the basement of Barre Hall for library functions, particularly as a satellite study/reference center. Work continues on studying the concept of locationing study/reference sites outside Cooper Library in facilities near it.

Goal 6: The Libraries will increase its funding base from external sources.

During 1993 the Libraries received a major gift from the Liberty Corp. and the Hipp family to support the Libraries being the repository for the records of Liberty Corp. and the substantial records of the Hipp family. These records are extremely significant in the corporate history of the Upstate of South Carolina. The funding received from the Liberty Corp. and the Hipp family has assisted in the installation of the mobile shelving in Special Collections.

Another major collection acquired were the papers of Charles Daniels from the Fluor Daniel Co. This collection also was a very significant reflection of the corporate development in South Carolina.

The Libraries continued their annual mail solicitation, with two mailers during the year, one a special centennial mailer. The Libraries received more than \$40,000 from these efforts. The Libraries Book Fair netted more than \$5,500 during fall 1993.

A major lift in funding for the development of the collections came with the decision by IPTAY to donate \$100 for each former athlete and IPTAY member who passed away. During the fiscal year, \$5,800 was received from IPTAY through this program. A process has been developed which provides IPTAY with the titles of the books purchased and assigned to each memorial.

New ideas for fund raising for the Libraries continue to be generated by the Libraries' staff. A Library Centennial Cookbook was printed, and profit from the sales is being made available to the Libraries.

The staff of the Architecture Library held the second annual Adopt-a-Book Fund Raiser during the College of Architecture homecoming activities in fall 1993. This event was relatively successful, and much productive feedback was received. The unit worked with Dean Barker on a proposal for a grant from the S.C. Board of Architectural Examiners and by the end of the year, a grant of \$15,000 was received for the acquisition of materials for the Architecture Library with an emphasis on materials which will be beneficial to the continuing education of practicing architects.

Library Statistics 1993-94

Collections	1992-93	1993-94
Cataloged Volumes.....	797,997	825,912
Government Documents.....	637,336	627,456
Microforms, Pieces	1,715,200	1,033,672
Serial Subscriptions.....	6,611	7,114
Maps	19,592	20,341
Slides	84,347	85,430

Uses

Interlibrary Loans Borrowed.....	9,799	12,324
Interlibrary Loans Loaned.....	7,238	14,219
Items Circulated	349,839	297,613

Services

Reference Desk Questions.....	72,914	64,662
Telephone Reference	1,409	3,021
Bibliographic Instruction Classes	49	64
E-mail Reference	50	30
Document Delivery Requests	4,575	5,747
Records Center Reference Queries.....	n/a	578
Microfilm Reels Produced.....	n/a	85

Computer Searches

Do-It-Yourself	2,191	2,073
Reference.....	23	15
Research.....	49	41
DORIS.....	62,169	54,982

Computing and Information Technology

Computer Center

Despite budgetary setbacks at the University and continued technological uncertainty in the computer industry, the Computer Center made considerable progress in FY '93-94. Continuing to focus on the broad goals of the DCIT strategic plan and taking advantage of advances in technology enabled the center to substantially improve its service offerings.

The pending introduction of various new on-line systems and the increased use of existing systems had given rise to fears that system performance might be significantly degraded. In fact, a modest computer upgrade and a switch to new disk technology noticeably improved system performance even as the system load increased.

Electronic mail increasingly is replacing paper and telephone communications. The center is on schedule with its project to integrate diverse mail systems into a single, easy-to-use system. On-line calendaring also is rapidly gaining adherents as more people become comfortable with using the computer through their use of e-mail and the various University administrative systems.

The center is promoting an orderly progression to client/server computing which permits increased functionality at the user level while maintaining centralized control of institutional data. There are major financial and logistical issues to be resolved in a successful move to a client/server environment. The center, along with the rest of DCIT, is successfully managing the transition in such a way as to provide the benefits of client/server computing while at the same time minimizing the associated risks.

A University-wide task force formed by the Computer Advisory Committee recommended that the University fund DCIT to provide additional microcomputer laboratories to be dedicated to teaching. This has become necessary because reservations by classes have made the Computer Center's public access laboratories largely inaccessible to students. At the start of the '94-95 academic year the additional funding requested had not been secured.

The center's training division has expanded its offerings and now provides training on administrative systems in cooperation with various administrative units. Training for students has shifted from noncredit short courses, which were of questionable effectiveness, to in-class sessions in existing for-credit courses. The new approach appears to be far superior, though more demanding of center staff time.

The Clemson Computer Network continues to be enhanced. The center has accepted the responsibility for providing a network connection to the desk of each faculty member, since departments were inconsistent in providing funds to connect from the desktop to the network backbone. Network traffic is growing very rapidly, and network support will indefinitely take up an increasing share of the center's financial and personnel resources. Demand for Internet services is an area that has the potential for explosive growth.

FY '93-94 was a year of solid progress. The only significant potential problem is that budget cuts have made it increasingly difficult to expand certain services, particularly those that involve an investment in hardware and software. Without corrective action, as the University further integrates the use of the computer into its academic programs and administrative processes, the lack of investment in the information technology infrastructure will become apparent. Proper integration of the DCIT strategic plan into the University's strategic plan will help prevent this, and steps are being taken to insure that integration takes place.

Administrative Programming Services

Administrative Programming Services (APS) develops information systems for Clemson University. Its mission is to provide support to administrative units as well as to faculty, students and staff members. At present some 20,000 members of the campus community access information systems supported by APS. These systems span all major functions of the University.

During the FY '93-94, the largest project in the department was a major upgrade to the student financial aid systems. The main goal was to provide a substantial increase in service to students. To do this, features such as voice response and electronic funds transfer were installed. APS worked with contract analysts in Information Systems Development to complete this large project in one year. Clemson's financial aid systems now are among the best in the country.

The first step toward migrating administrative systems to a client/server environment was taken in FY '93-94 with the installation of the Data Warehouse. It stores detail and summary information derived from Clemson's administrative data bases. Users can construct queries on a personal computer using desktop software, and the information is retrieved through the computer network from a relational data base server located at the Information Technology Center. The DCIT strategic plan

calls for the migration of administrative systems to a client/server environment by 1997.

Significant progress was made in FY '93-94 in the use of electronic forms in administrative systems. Electronic forms replace paper documents to conduct business. They are routed electronically through the approval process and are automatically posted to appropriate data bases. By the end of the year all departments were using electronic leave forms. Additionally, an electronic CUBO-402 personnel/payroll action form was introduced. It now is being used by many departments.

APS supported 70 administrative systems in FY '93-94. On a typical day, about 800 faculty and staff used on-line systems to conduct University business. Also, several hundred students used the student information system daily to access academic, placement and financial records. Additionally, use of the on-line library catalog and the periodical indexes increased this year.

Working with the staff in Institutional Advancement, APS installed a comprehensive development/alumni system this year which significantly improves support for all fund raising and alumni support activities. This project was the first large system to use relational data base features. Follow-on improvements will be completed next fiscal year.

APS participated in planning for new business systems during the fiscal year. It is anticipated that these systems will use non-mainframe hardware and data base technology. Accordingly, a great deal of training and re-tooling were accomplished to enable APS to support these systems as soon as they are procured.

Information Systems Development

Information Systems Development (ISD) is a self-supporting unit of DCIT that provides information technology services under contract.

ISD's major customer is the S.C. Health and Human Services Finance Commission, for whom ISD develops and maintains a variety of Medicaid-related systems, including the Medicaid Management Information System. The debate over health care reform has led to considerable uncertainty during the long-term future of ISD's health care-related contracts. This despite the fact that ISD has, for almost 20 years, provided a consistently high level of support to the Medicaid system that has been more than satisfactory to the customer. As it turns out, health care reform is likely to have little short-term effect on ISD contracts and may even lead to expanded opportunities in the future.

ISD is strengthening its relationship with the S.C. Department of Health and Environmental Control (DHEC) with additional contracts. DHEC is becoming an increasingly valuable customer as ISD strives to diversify its service offerings and its customer base. DHEC has provided ISD with opportunities for a variety of contracts, from design and maintenance of personal computer networks to the development of major mainframe applications.

The University now is looking to ISD to provide systems development services to the University under contract. The advantage to the University is that ISD provides a specified level of support for a specified time. The University is not required to make a permanent commitment of resources to DCIT. This has enabled the University to develop new software systems for the Registrar's Office and for the Office of Financial Aid using one-time money that became available in FY '93-94.

ISD continues to contract with the Clemson University Research Foundation (CURF) to provide R&D services to commercial companies. Royalties from the sale of ISD-developed software are a major source of revenue for CURF, and the associated contracts generate significant revenue for ISD.

FY '93-94 was another successful year for ISD despite the uncertainties related to ISD's core contracts. ISD remains stable with a highly competent staff and a solid portfolio of contracts.

The Graduate School

For the first time in six years, no requests for approval of new graduate programs were submitted to the Commission on Higher Education. This is a consequence of a decision by the administration to expand only in the direction of programs that complement the University strategic plan and where significant external funding is available.

Completed applications for the 1993 fall semester equaled 5,152, a decrease of 14 percent. A decrease was anticipated due to the presence of nonresident academic fees, effective in August 1993. Forty-one percent of the applicants was accepted, essentially constant for the past eight years. Data for enrolled students are as follows: total enrollees 4,265 (-4 percent), new enrollees 1,090 (-16 percent), full-time enrollees 1,995 (-6 percent), females 2,012 (-3 percent) and internationals 775 (-5 percent). During the '93-94 academic year, 1,299 received masters degrees (+12 percent), and 110 received doctoral degrees (+12 percent). We expect several more years of increasing numbers of graduates, a result of the large surge of new enrollees and new programs in the period 1988-1993.

The first year of a decentralized application process (departmental option) brought about mixed results as departments and the Graduate School experienced steep learning curves. Twenty-eight percent of the departments elected the option, and all parties will benefit from lessons learned in FY '93-94. Within the FY '94-95 year, we will utilize a self-managed application process for domestic applicants. This is unrelated to the decentralization option and will enhance the application process irrespective of the option selected. Five years of experience with this application process for international applicants has proved it to be an effective and cost-saving approach. We also hope to implement within the next six months a process for accepting electronic applications directly from the students. This will require significant investment in computing resources.

Clemson has been an active participant among graduate schools in the United States assisting the Turkish government with an ambitious program to educate 1,400 students who will become members of the faculty at 23 new universities in that country. One of these universities could have as many as 25 percent of its faculty holding terminal degrees from Clemson. The students, who are fully funded from a scholarship program, represent the brightest and best of young scholars in that country by virtue of the rigor of the selection process. As many as 40 Turkish students could be enrolled in the '94-95 academic year in six of the nine colleges.

Dr. Frankie Felder, assistant professor of elementary and secondary education, joined the Graduate School as associate dean. While she will participate in all administrative functions of the Graduate School, Dr. Felder will have lead responsibility in pursuing grants and financial assistance for graduate students and recruitment and retention of minority students.

International Programs and Services

Applications for 1994 from international students totaled 3,167, representing 2,517 who paid the application fee and 650 who did not pay and thus were discarded; 1,960 applications (up from 1,365 in 1993) were completed and sent on to departments where 894 (up from 752 last year) were accepted. Of these, 776 were accepted for fall 1994. I-20 and IAP-66 documents were issued to 402 students who provided sufficient financial documentation. Of this number, a total of

287 new international students registered in 1994 (approximately 142 of these registered in the fall). This 35 percent response rate for fall 1994 of applicants issued I-20 and IAP-66 documents is somewhat lower than arrival rates in the past. Fall enrollments in the two years prior to 1993 totaled 200 or more. This brings the total number of students to 659, or a decline of 93 internationals (12 percent) from fall 1993. The decline from spring 1994 was only 32 students (5 percent).

Several factors continue to explain this decline: the increase in the nonresident graduate tuition begun in fall 1993. Judging from the small decline from spring, this may be declining in importance. Financial limitations in India and China (the two largest contributing countries) and what appears to be stricter visa controls by the U.S. consulates in India, China and perhaps other countries, continue to be issues. Students are being required to demonstrate sufficient ties to their home country in order to be allowed student exit visas. Chinese students received resident immigrant status for the last year to reduce the number of Chinese with non-immigrant visas. Other universities and college also are mounting more recruiting efforts to attract very qualified international students.

In addition to currently enrolled international students, OIPS has authorized and is required to track 150 international students who currently are performing optional practical training connected with the completion of their degree programs at Clemson.

The fall 1994 international population represents 62 different countries (nine fewer countries than in fall 1993) and every continent. The top five countries by student population in fall 1994 are India (266 or 40 percent of the total), China (129 or 20 percent), Turkey (43 or 7 percent), France (29 or 4 percent), Taiwan (22 or 3 percent) and Germany (15 or 2 percent). Trends include the dramatic rise in students from Turkey and the continued decline in students from Korea and Taiwan. There also is a decline in the number of students from France and Germany. Special recruitment efforts on the part of the graduate school and supported by OIPS have resulted in the numbers of Turkish students. A similar effort by OIPS should result in a significant rise in the number of students from Thailand arriving next fall. Other recruitment efforts are being pursued to encourage more diversity and bring more students for future years.

Sponsored students, students on international scholarships and fellowships, number 27, including a number of Fulbright scholars. Study abroad services on campus now are operated out of OIPS. There are 11 students studying here under the International Student Exchange Program (ISEP) – this represents the highest number of ISEP students ever on campus at one time. This is due to a significant increase in CU student interest and participation in study abroad, a trend that should continue for some time to come. There are four students here on the exchange with Universidad de la Americas (Puebla, Mexico) and two from Universidad de San Francisco (Quito, Peru). There is one additional student on an IIE scholarship. In addition to these students, international professors, research scholars and specialists numbered 98 for the reporting period 3/15/93 – 7/14/94.

Programming offered by OIPS included new student orientation sessions for both fall and spring, tax seminars and an employment training seminar. International Awareness Week activities filled an entire week and included the 7th International Festival, the most popular to date with an estimated attendance in excess of 6,000.

The Houston Center for the Study of the Black Experience Affecting Higher Education

The center, administratively located under the senior provost and dean of the graduate school, continues to direct its efforts toward increasing the participation of African American students and faculty in postsecondary education.

Research activities this year were directed at minority recruitment, mentoring and participation of minorities in the sciences, education and business. Participants included, in addition to Clemson University researchers, representatives from eight of the state's public and private institutions.

As a part of its dissemination efforts, the center conducted three seminars, two of which featured findings of our research associates and the third, a computer workshop of special interest to social scientists on LISREL, was conducted by a vice president of the International Center for the Advancement of Scientific Literacy.

The center continues as an important member of the consortium for the S.C. Alliance for Minority Participation, funded by the National Science Foundation. We have received another grant funded by the National Science Foundation for SEEKERS, a summer science camp and club. Other projects begun this year include a video project featuring S.C. black scientists and minority student participation in two leadership workshops sponsored by major national manufacturers.

In July, 1994, the Houston Center was reauthorized by the Commission on Higher Education for an additional five-year period.

The National Dropout Prevention Center

Mission

Over the past eight years, the National Dropout Prevention Center (NDPC) has established a national reputation in the area of K-12 dropout prevention and educational reform of our public school system. The NDPC is a partnership of concerned leaders who represent business, educational and policy interests, and Clemson University. It was created to significantly reduce America's dropout rate. The center is committed to meeting the needs of youth in at-risk situations by shaping school environments which ensure that all youth receive the quality of education to which they are entitled. The NDPC has worked to accomplish this mission by providing information services, action research and technical assistance.

Information Services

The NDPC is a national clearinghouse on issues related to dropout prevention, at-risk youth and school reform. As such, the center provides information on a daily basis to thousands of clients each year.

The core of its information services is the FOCUS data base, a nationally accessible computerized data base located on the Clemson University mainframe computer. The NDPC collects abstracts and disseminates information through the five files in FOCUS: program profiles, calendar of events, resource materials library, organizations, and consultants and speakers. Users from all over the country benefit from this state-of-the-art resource. In addition, by a special arrangement with New York City Public Schools, the FOCUS data base is provided to them via local access. The FOCUS data base was used as the model for the new data base for the University of Minnesota-based National K-12 Service Learning Clearinghouse, a national cooperative in which the NDPC is a significant partner.

The center staff also disseminates information via a quarterly newsletter, periodic research-based monographs, numerous other publications and videotapes. This past year, publications have included "Enhanced Vocational Education: Developing a District-Wide Dropout Prevention Program," by retired Clemson University professor Dr. John V. "Dick" Hamby and Fred Monaco of Pittsburgh Public Schools; "Promoting Success for the African-American Male: A Blueprint for Action" by Dr. Gary Reglin of UNC-Charlotte; "Resolving Conflict through Peer Mediation" by Marie Rogers, a Clemson graduate student who worked a year at the NDPC; a National Dropout Prevention Network Directory of network members; and, due to the continuous demand for this student-oriented booklet, a reprint of "So You Want to Drop Out of School: You Ought to Know the Facts." In addition to their distribution through the National Dropout Prevention Network, approximately 12,000 publications have been sold nationwide this year. The center also has developed and begun to market some staff development board games for educators in the area of service learning: *Nuts and Bolts*, designed to teach the concepts of service learning and *Curriculum Connections*, designed to assist teachers in integrating service learning into their curriculum. In addition, a game for students, *Neighborhood Squares*, introduces them to the concept of service learning. The NDPC and the Network, in cooperation with West Georgia College and Technomic Publishing Co. Inc., initiated a new series that addresses at-risk youth with the publication, *Using What We Know about At-Risk Youth: Lessons from the Field*. The most significant publication event of the past year, however, was the inauguration of the premier issue of the *Journal of At-Risk Issues*, a research journal published in coordination with the National Dropout Prevention Network.

As a follow-up to last year's visit by John Hughes, British Petroleum Co. Ltd. (BP) coordinator of student tutoring from Imperial College, London, England, the National Dropout Prevention Center has become a cosponsor of an international conference to be held in London, England, in April 1995. Based upon the center's experience in mentoring and tutoring, BP asked the NDPC to assist with the planning of this major event. Interestingly, much of the preplanning took place via the Internet and e-mail. Two staff persons will be in attendance at the actual conference next April with a presentation about the benefits of using at-risk students as tutors.

The NDPC employed four Clemson University graduate and undergraduate students for the past year. These students assist the center in the FOCUS data base, special projects and the publications department. All graduate students are encouraged to work on a publication during their tenure with the center. In addition, two participants from the CAP program worked at the NDPC for six weeks this summer.

The center's work in information services provides a strong foundation for its other activities. These other functions draw upon and enhance the information base of the NDPC.

Action Research

As it has from its inception, the center has been involved in a variety of action research projects in FY '93-94. School sites from across the country are laboratories for program and product development on critical dropout prevention issues. NDPC involvement this year has been with the Pine Belt Educational Consortium, Centerville Elementary School, Simpson Academy, F.J. Delaine Elementary School and Wren Middle School.

The center completed its involvement with the Pine Belt Regional Service Center (PBRSC) project in Laurel, Miss. Funded through a federal grant in March 1992, the PBRSC serves approximately 125 at-risk students from eight school districts across six counties who need a nontraditional and innovative approach

toward completing their education. The center's role in this project has been to provide staff development activities and conduct formative evaluation of this unique school setting.

As the third-party evaluator, NDPC has assisted Centerville Elementary in Anderson, S.C., in identifying data necessary to establish baseline measures and collection procedures for ongoing evaluation of the project. In addition, center staff has assisted in developing data collection instruments for caseworker reports, surveys of parent perceptions and measurements of self-esteem in primary grade students.

The NDPC also has been involved with Simpson Academy, an alternative school for middle school age children within the Pickens County School District. One of our staff serves on the school's advisory council, and our assistant director worked with the staff in developing their five-year plan.

In collaboration with the Architectural Studies program at Clemson University, the NDPC completed a year-long study of the F.J. Delaine Elementary School to develop a prototype school to expand the scope of learning for students and adults in the Sumter, S.C., community. A satellite community library within the school, nongraded instruction, and a parent and child development center were among the design elements presented in the proposal for a "Community Center for Learning and Well-being."

The center has begun a new relationship with Wren Middle School in Piedmont, S.C. Wren has become one of 38 schools nationwide which will model service learning, and the NDPC will work as the consultant. The relationship began this summer with a contract course with the school district entitled "Integrating Service Learning into Curricula." This course was taught by center staff in collaboration with Dr. Carol Weatherford of the Department of Elementary and Secondary Education. The work will continue with Wren as we continue to monitor and upgrade their capacity for service learning.

Action research has enabled the NDPC to become a national leader on the cutting edge of successful dropout prevention initiatives.

Technical Assistance

The center provides technical assistance in developing and submitting proposals, planning and implementing staff development activities, program planning and evaluation, establishing mentoring and service learning programs, and broadening collaborative networks. This past year has seen the NDPC working with the National Basketball Association, the National Youth Leadership Council, the S.C. Department of Education, the S.C. Lieutenant Governor's Office, Milliken Corp. and other state businesses, the Tennessee Department of Education, the Arkansas Department of Education, the Florida Department of Education, the Partnership for Academic and Career Education (PACE) Consortium, Navy Jr. ROTC, the U.S. Army and Visions for Youth.

The National Basketball Association's Stay in School program was created in 1989 to address the critical issue of high school dropouts. The program includes several national and local elements designed to deliver the stay in school message to students, particularly those in middle school grades. The program's national elements include a series of televised public service announcements in which NBA stars encourage students to stay in school; school visits by current and former NBA players and coaches; and a nationally televised special during the NBA All-Star Weekend. NBA legend Bob Lanier, a member of the Basketball Hall of Fame, is the national chairman of the NBA Stay in School program. Lanier, who has a lifelong commitment to young people, delivers an inspiring and personal message of pride and self-esteem in visits with students across the country. During the '93-94 season the National Dropout Prevention Center and the NBA continued their

partnership with the center providing technical consultation to the NBA program. This assistance includes developing educational outreach to students, teachers and parents; developing public service messages and Stay in School Celebration telecasts; and completing research and evaluation on the impact of the program. A teacher survey was developed and used with more than 1,300 teachers in 53 middle schools in the greater Minneapolis, Minn., area involved in the '93-94 NBA Stay in School Program.

The NDPC now is part of a national cooperative, the K-12 Service Learning Clearinghouse, funded under the Corporation for National and Community Service. The center's role is to be the lead Regional Technical Assistance Center for the south in meeting the needs of 12 southern states; partners in this task are the Arkansas Department of Education regionally and the National Youth Leadership Council nationally. In this new role, the center provides teachers and community workers throughout the South with training and resources in the area of service learning. The center co-hosted the first Southern Institute on Service Learning which was held in Little Rock, Ark., April 29-30 and will host the second institute in Greenville, S.C., in May 1995. The center also publishes a biannual newsletter for more than 1,000 service-learning educators in the 12-state region to keep them abreast of service learning initiatives. The center has provided a great deal of technical assistance and training in the region, including participation as a key national consultant to the Florida Department of Education and its state institute.

In 1994, the NDPC became one of seven national partners in the National Service-Learning Initiative, currently funded by the W.K. Kellogg Foundation. The center joins the National Youth Leadership Council (MN), the National Indian Youth Leadership Project (NM), Project Service Leadership (WA), the Michigan K-12 Service-Learning Clearinghouse (MI), the Pennsylvania Institute for Environmental and Community Service Learning (PA), and the Arkansas Department of Education (AR) in a capacity of national leadership in the field of service learning. Project goals for this year include the guiding of Wren Middle School in the integration of service learning as a means of school reform; the offering of a graduate level course for classroom teachers in service learning methodology; and the holding of a teacher educator institute for college and university professors of education from the southern region. Plans are under way now for this January 1995 event.

The NDPC played a leadership role in establishing and managing a new, statewide educational initiative: The Lieutenant Governor's Action Council for Youth (LEGACY). This council consists of approximately 25 members representing business, education and government. During the initial year the council planned, implemented and financially supported a three-phased activity, the LEGACY Leadership Institute for S.C. Teachers. Fifty teachers, each representing a different school district across the state, gathered for a total of 12 days during the '93-94 school year to receive instruction and training in effective teaching strategies for the at-risk youth population. These teachers, known as LEGACY Teacher Ambassadors, have utilized these new strategies in their classrooms and have served as trainers within their own schools and districts, conducting 76 workshops for more than 1,600 educators both within and outside the state. As LEGACY Ambassadors they also developed a video, a Teacher's Tip Guidebook, a LEGACY Teacher Directory and a commemorative quilt which was presented to the lieutenant governor and now is displayed in his office in Columbia. The LEGACY program has begun its second year of operation with 40 new teachers from across the state. They will participate in a similar educational experience as the first cadre of LEGACY Ambassadors. Thus, this program is continuing to build a base of teachers who have expanded their knowledge and skills to become renewed,

energized and more effective inside the classroom with students and outside the classroom with colleagues.

In partnership with the PACE Consortium, (consisting of Tri-County Technical College, Pendleton, S.C., and seven school districts), one of the nation's leading Tech-Prep programs, center staff have provided both staff development and the development of curriculum materials using integrative learning. During the past year a manual was developed by NDPC staff to enable these materials to be used by facilitators not only in the local consortium, but in Tech-Prep programs nationwide.

Center staff provides technical assistance to the county Vision agents and serve on the State Council for the Visions for Youth project sponsored by the W.K. Kellogg Foundation.

The NDPC hosted its Fourth Annual Summer Leadership Institute on the campus of Clemson University July 10-14, 1994. Fifty-six educators, representing 14 states, attended this week-long institute titled, "Active Learning: A Student-Centered Approach to Dropout Prevention." Sessions were led by national experts and NDPC staff and included topics such as multiple intelligence and current brain research, service learning, learning styles, cooperative learning, pair therapy, discipline and practical applications of active learning strategies.

A major partner with which the NDPC is involved is the National Dropout Prevention Network. This network of some 2,000 members is guided by an executive board of national leaders representing educators; policy makers; community, business and labor groups; parents; and other concerned persons. The NDPC functions as the network's fiscal agent, providing information services and technical assistance to members located in all 50 states and several foreign countries. One of the major joint efforts of this partnership is the national conference held each year in the spring. This past year the National Dropout Prevention Conference was held in San Jose, Calif., attracting more than 1,400 attendees. Center staff provided an all-day conference pre-session on active learning. The NDPC and the Network introduced an annual survey of the 1993 network membership. The purpose of the survey was to answer the question, "Is school reform serving the at-risk population?" Four national issues including school violence were studied using a 56-item instrument.

The staff of the National Dropout Prevention Center conducted more than 50 specialized workshops during the year on a variety of topics. Representative of the different clients were the Navy Jr. ROTC, Junior Achievement, the Tennessee Department of Education, the Florida Department of Education and individual school districts. These assignments found the staff working in states from California, Arkansas, New Mexico and Colorado to Florida, Georgia, Virginia and Tennessee.

The National Dropout Prevention Center has maintained its position of influence on the national agenda, and its contributions to education continue to be significant and far-reaching. Its agenda for the future builds upon this position of strength, and the center envisions a year of even greater national impact in '94-95.

South Carolina Energy Research and Development Center

The S.C. Energy Research and Development Center (SCERDC) is a state-chartered research and development organization committed to developing useful

technology for the citizens of South Carolina and the nation. The SCERDC was established via the S.C. 1981-82 General Appropriations Act with the mission to:

- Promote energy research and development in and for the state of South Carolina.
- Coordinate energy related matters among local, state and federal agencies, industries and state educational institutions.
- Transfer energy technology from other energy research and development centers to S.C. applications.
- Contribute to national energy issues in areas of excellence.
- Promote statewide energy educational activities.

The SCERDC focuses on applied research that matches technical solutions with state and industry needs. Key abilities of SCERDC include building effective project teams and acquiring the resources necessary to accomplish project objectives. The SCERDC may serve as a contract/grant recipient and/or contract/grant administrator.

The SCERDC was selected by the U.S. Department of Energy to coordinate a consortium of more than 60 universities in 33 states to provide the nation's gas turbine manufacturers with technology needed to bring the power industry into the 21st century. Under the Department of Energy's oversight, the consortium brings together the engineering departments of the nation's leading universities and the industrial gas turbine developers to ensure that the next generation of natural gas turbines are built on a solid base of knowledge. At present, SCERDC is supporting 23 university projects selected by the consortium's industrial members. The projected value of the contract is \$37.4 million, with a contract life through the year 2000.

After a year's delay, construction of the Pulsed Atmospheric Fluidized Bed Combustion facility has been initiated with site cleaning and foundation design. On-site facility construction is expected to begin in late October 1994. When this facility is completed, it will be one of the most advanced coal combustors in the world and the only facility of this type. Research opportunities in mechanical, chemical, environmental and materials engineering will immediately be available. This PAFBC unit is rated at 50,000 lb/hr of steam. A facility of this size and newness will provide unique education and research opportunities for faculty and students that normally are not available on a university campus. Presently, laboratory scaled cold flow modeling experiments are under way on this \$5.6 million project.

The SCERDC concept of a Resource Recovery Park that accepts municipal solid waste and converts it to useful value added products continues. The local counties of Anderson, Oconee and Pickens have agreed to participate together on this challenging issue with SCERDC. The potential technologies at the park for energy conversion include composting, acid hydrolysis, steam reforming and power production for example.

The analysis of two years data on energy consumption in a manufactured housing complex has been completed. The data analysis has resulted in an understanding of how energy is consumed in these homes and how homeowners can conserve energy and reduce power consumption. A fact sheet now is being developed for nationwide distribution by DOE.

Energy R&D News and Update are two newsletters issued by SCERDC. On an annual basis these newsletters reach 1,520 individuals first hand. The SCERDC hosted a combustion workshop in Nashville with the assistance of Vanderbilt University and the SCERDC now is planning a heat transfer workshop in cooperation with Clemson University. Symposium on Energy Futures IV will be offered in the spring.

The SCERDC now administratively reports to the office of the provost with direct responsibility to the senior vice provost and dean of the Graduate School. An internal advisory committee guides SCERDC activities via oversight meetings and planning sessions.

Strategic Planning and Quality Management

The primary emphasis of the University's Office of Strategic Planning has been support for the University's strategic planning process. During the past year the focus has been on implementation.

Due to a series of external events and opportunities, the committee structure was streamlined and reconstituted. A new Strategic Planning Committee was formed and given the charge to plan the implementation for the University Strategic Plan and to coordinate a series of task forces which will recommend University-wide changes and incentives for continuous improvement. Six task forces have been established to identify barriers to change and recommend changes and incentives to help the University achieve goals outlined in the strategic plan. The task forces and a brief description of their tasks are as follows:

- The Budgeting/Funding System Task Force will create a flexible University-wide resource generation and allocation system that encourages quality and responds to the education, scholarship and outreach goals of the University.
- The Faculty Reward System Task Force will recommend changes in the promotion, tenure and reward system to encourage excellence in teaching, scholarship and service to the University, the professions and the public, within disciplines, as well as within interdisciplinary activities.
- The Academic Organizational Structure Task Force will focus on the academic structure of the University and will develop alternative structures which will reduce administrative costs and be more flexible and responsive to the needs of the University and its strategic plan, including teaching, research and outreach.
- The Administrative and Support Organizational Structure Task Force is charged with recommending options for alternative structures to reduce administrative costs and increase organizational flexibility.
- The Professional Development Task Force will recommend a systematic model for transforming Clemson University into a culture that invests resources to promote, support and reward professional development through continuous learning in order to serve the career and personal needs of faculty, staff, students and administrators, and to respond to institutional objectives.
- The Staff Rewards Task Force is charged with recommending options for improving Clemson's ability to recruit, promote and retain highly qualified staff members to advance and provide support for the University's teaching, research and service mission.

The task forces are to present their recommendations to the board of trustees in September 1994.

In addition to their work in support of the University's planning process, the department also facilitated strategic planning and continuous improvement activities in some of the University's academic colleges and departments as well as some administrative units. The office also presented a workshop on strategic planning to the academic department heads.

The Strategic Planning Office also served as support for the Alliance 2020 project. With funding received from the Kellogg Foundation, Alliance 2020 – Clemson University, S.C. State University and the State Technical College System is developing new approaches to thinking and working together to build the capacity of the people of South Carolina. This alliance intends to create a shared vision for land-grant education in the 21st century.

The objectives of Alliance 2020 are as follows:

- Build lasting bridges among the Alliance institutions to create a sustainable network of relationships.
- Extend and institutionalize the sense of alliance within each institution.
- Build the capacity of faculty and staff from all three partners to work together and with constituents (communities, businesses and others) to envision and achieve a preferred future.
- Eliminate the internal institutional barriers to doing multidisciplinary, multi-institutional work.
- Synthesize knowledge and develop experimental models for food systems education. In defining "food systems," the Alliance includes: agricultural production, processing, marketing, transportation, preparation, retailing and fiber.

The Strom Thurmond Institute

The Strom Thurmond Institute of Government and Public Affairs is Clemson University's flagship public policy organization. The institute is dedicated to the principle that broad access to knowledge, and a free exchange of ideas will result in more effective government. The institute, therefore, sees as its purpose the promotion of awareness of public policy issues among citizens and the advancement of public sector problem solving throughout the University's teaching, research and public service activities.

The institute accomplishes its mission through four major avenues: its Public Policy and Regional Development Programs, its Public Events and Lecture Series, a cross-disciplinary joint Public Policy Program, and a Publications Program. The scope of the Strom Thurmond Institute's programs is national and international, but its focus is on South Carolina. Furthermore, as a public policy and regional development center for a land-grant University, the institute will continue to place emphasis on rural and community development issues in South Carolina.

Public Policy and Regional Development Programs

The Public Policy and Regional Development programs at the institute have involved many areas of domestic and foreign policy. During FY '93-94 the major areas of emphasis were decision technologies, economic policy, regional development, retirement studies and state and local government policy. Other research and public service activities in which the institute has been engaged in the past include energy emergency planning, engineering and technology policy, water policy, comprehensive land-use planning, taxation policy, county needs assessments, econometric modeling and municipal incorporation.

Decision Technologies Spatial Analysis Laboratory: The Decision Technologies research agenda addresses the role of computer technologies in the decision-making processes associated with environmental policy, natural resource management and community development. The decision tools presently being utilized include remote

sensing, geographic information systems (GIS) and the global positioning system (GPS). Decision Technologies projects include the following:

Wetlands Information Services: This three-year wetlands mapping project started in 1992. The project is funded through NASA's Earth Observation Commercialization Applications Program. Projects in this program typically are joint research ventures between private business and universities. The Strom Thurmond Institute's business partner is Applied Analysis Inc. (AAI) based in Billerica, Mass. The objective is improving wetlands data through software development and marketing the data base for development planning purposes. The project integrates remote sensing, GIS and GPS for wetlands mapping. Clemson will be the national alpha test site for AAI's software, which by 1995 will be bundled with ERDAS Inc. image processing software.

Gap Analysis Mapping of Diversity of Biological Resources: This is a two-year project with the Archbold Tropical Research Center of Clemson University and the Regional Wildlife Management Program at Universidad Nacional in Costa Rica. The project tests a conservation mapping model proven in the United States in Costa Rica, and it establishes data requirements for the international application of the model. The information from the project will be used for development planning and will establish data requirements for additional international applications of the gap analysis model. USAID has expressed interest in applying this technique to all of Central America. As a result of this project, Columbia University Press has contracted with the Archbold Center's Thomas Lacher and the Thurmond Institute's Basil Savitsky to produce a book documenting the project and the applicability of gap analysis to other regional and national issues.

Retirement Studies Laboratory: The idea for the lab evolved from ongoing activities involving demographic shifts and policy issues surrounding our aging population. Two projects already have been housed in the lab. The first, the New South Carolinians Study, has been completed and suggested a profile of recent retired in-migrants to South Carolina. The second, a project funded by the AARP Andrus Foundation, brings retired residents of McCormick County together with the at-risk youth of the John de la Howe School to share experiences in a mentoring atmosphere to help run Howe-To Industries. Another project under way is building upon work accomplished through our New South Carolinians study which profiled the types of individuals retiring to South Carolina. The Institute has established ties for a cooperative relationship with Patrick Mason and the Center for Carolina Living to provide spatial analysis of in-migrant data in order to more fully understand S.C.'s retiree market. The goal of the laboratory is to bring together faculty and staff from across Clemson and throughout the state to examine the social, economic and political implications of retiree migration patterns in South Carolina and throughout the nation. The lab will provide focus and visibility for ongoing activities and provide a mechanism to expand research and information distribution for this important area of policy development.

Economic Policy: In 1992 the institute re-initiated the Economic Outlook Project. This program, directed by Bruce Yandle, former institute director and senior fellow, focuses attention on the national, regional and state economies through a series of economic outlook conferences, regular reports on the economic situation, columns for newspapers and special programs presented to business and civic groups and public sector organizations throughout the country.

Regional Development: This area of research, which is a joint venture between the Strom Thurmond Institute and the College of Forest and Recreation Resources,

focuses on regional development, natural resource utilization and natural resource-based economic development. Regional development projects include the following:

An Educational Partnership — John de la Howe/Clemson University: In 1987 the John de la Howe School (JDLH) (founded in 1797 by Dr. John de la Howe) and Clemson University entered into an agreement that allows both agencies to synergistically utilize each other's expertise to enhance their students' learning opportunities. Howe-To Industries at JDLH consists of a student cooperative in which JDLH students produce products to sell at the market while others are involved through partial enterprise management and/or ownership. A 1930s era CCC barn has been renovated and was opened April 30, 1993, with the assistance of students from the College of Architecture and serves as the marketplace for Howe-To Industries. JDLH students and McCormick area retiree volunteers (from the AARP Andrus Foundation volunteer project) are involved in craft production, raising catfish, vegetable gardening, greenhouse work, container and field nursery efforts and working with livestock, including cattle and horses.

Nature-Based Tourism and Rural Coastal Development: During the summer of 1990 the National Coastal Resources Research and Development Institute provided three-year funding for a demonstration project to assess the feasibility of utilizing nature-based tourism enterprises as a rural coastal/regional development strategy. This project is developing a nature-based tourism enterprise model with associated market demand assessment, regional site capabilities and business formation strategies. The first phase of the project included enhancing the tourism economy of rural Georgetown, Colleton and Beaufort counties by utilizing a mix of marshes, estuarine environs, and black-water rivers; combining tourist-based opportunities in these natural areas with designated natural resource preservation goals; slowing coastal land conversion to high density use by providing alternative economic options and strategies for local landowners and residents; developing prototypical guidelines for local citizen involvement in coastal development issues; and developing reports and video materials illustrating coastal nature-based tourism opportunities.

The next phase of the project will determine how nature-based enterprises can survive in rural coastal areas. By using data and ancillary information from our market and resource assessments, a marketing campaign for regional nature-based tourism enterprises is being developed. The campaign is being monitored by tracking responses determining expenditure patterns from the nature-based tourists. In addition, the project will use techniques from our work in our Public Participation in Community Planning program in order to monitor the expectations of a community whose economy is at least partially dependent on these types of enterprises. These planning techniques have proven to be both an enjoyable citizen participation process and a powerful tool for developing community consensus regarding needed planning actions.

Small Town Development: The institute is actively involved with the S.C. Downtown Development Asso. Inc. in assisting with community and economic development for small towns. Both Summerton and Allendale are serving as pilot communities. The institute also has worked with Honea Path, Donalds, Ninety Six, McClellanville and Little River.

Public Events and Lecture Series

The institute features individual lectures, panels, round table discussions, seminars and special presentations on current issues in public policy. The majority of our events are open to students, faculty, staff and the general public at no cost. The institute's Self Auditorium is well equipped and seats 234 people. In 1994 the institute sponsored or cosponsored about 37 programs. Due to building renova-

tions we had to close both the Nancy Thurmond Room and the Self Auditorium for periods during the year.

Strom Thurmond Seminar in Government and Politics for Social Studies Teachers. '93-94 was the 12th year in which the institute conducted this seminar in government and politics on an issue of interest to high school and middle school social studies teachers. Twenty teachers were selected on a competitive basis to participate in the seminar. The first week is held on the Clemson campus and consists of lectures and guided discussions on various aspects of the topic for that year by Clemson faculty and invited lectures. The second week is spent in Washington, D.C., where seminar participants are afforded the opportunity to visit government and private agencies dealing with the issue at hand, spend time on Capitol Hill in discussions with members of Congress and hear lectures and guided discussions by policy makers and opinion leaders. This year's seminar topic was "The Collapse of the Soviet Empire and the New World Disorder." The seminar is presented through the cooperation of the Department of Political Science, College of Liberal Arts and the College of Education. The 1994 seminar was partially funded by the S.C. Department of Education.

Harris Page Smith Lecture Series. The fifth annual Harris Page Smith Memorial Lectures on Local Government in South Carolina were held on November 11, 1993. The series was begun by the institute in 1989 to honor the late Senator Harris Page Smith. The speakers, who are the presidents of the S.C. Association of Counties and the Municipal Association of South Carolina, address the major issues, challenges and opportunities facing county and municipal governments in the state. Speakers this year were William L. McBride, Beaufort County Council member and president of the S.C. Association of Counties, and William D. Workman III, mayor, city of Greenville and president of the S.C. Municipal Association.

Economic Development Policy Workshops. Biweekly Economic Development Policy Workshops bring together faculty, staff, graduate students and public officials interested in economic development policy questions. The Community and Economic Development program coordinates the series, scheduled biweekly during the academic year from 12:30 to 1:30 PM in the Nancy Thurmond Room of the institute.

Joint Public Policy Programs

Some programs operating under the umbrella of the Strom Thurmond Institute represent joint ventures between the institute and other organizations on campus. This usually means that other colleges or departments contribute resources to the program in the form of funding and/or personnel, and the institute serves as the facilitating agent. Such is the case with two programs currently being operated within the institute: the Community and Economic Development Program and the Environmental Policy Program.

Community and Economic Development. In July 1989 the institute signed an agreement with the Cooperative Extension Service and the S.C. Agricultural Experiment Station to conduct the Community and Economic Development Program for the benefit of rural communities throughout the state. In 1992 this agreement was extended to include the College of Commerce and Industry and the University's Office of Public Affairs. While federal subsidies for local government programs have declined significantly, federal and state mandates regarding solid waste management, hazardous waste treatment, water quality and other issues have increased dramatically. Rural communities have felt the impact of these negative

trends even more. As young people have migrated to the cities, small towns have seen businesses move to the bypasses and the outlet malls, and young professionals such as doctors, lawyers and educators seek their fortunes in larger metropolitan areas.

The importance of the Community and Economic Development Program cannot be overstated. It is one of the vehicles through which Clemson will transform itself into the model land-grant University of the 21st century. By combining the strengths of academic units across the campus, Clemson will broaden its definition of public service to include not just the traditional agricultural and agribusiness sector, but education, research and service throughout all academic disciplines. Through the Community and Economic Development Program, Clemson makes the science, technology and policy research being developed on the campus available to all communities of South Carolina, but particularly to the rural communities that are in need of assistance.

In FY '93-94 the Community and Economic Development Program provided advice and consultation to communities, government entities and elected officials on a wide range of policy issues, including water planning, economic development, tax policy, local government finance, consolidation of public services, demographic changes, government restructuring, economic policy and strategic planning. Program faculty also conducts applied policy research on state and local issues.

The program continues to publish a quarterly newsletter, *The Community Leader's Letter*, supported by the Clemson Cooperative Extension Service. It is mailed to more than 16,000 grassroots leaders throughout the state. Articles from this newsletter have been quoted in newspapers across the state and used as background material for decision making.

To help develop thinking on the campus and in the surrounding community about economic development issues, a biweekly series of lunch time economic development workshops is in its second year. Every two weeks a speaker is invited to present remarks on an economic development issue, after which comments and discussion are invited from the attendees.

Environmental Policy Program: One of the four major focal points of Clemson's strategic plan is the environment. In accordance with that plan, the institute established the Environmental Policy Program in 1990. Much already has been done at Clemson in the areas of environmental science, environmental engineering and wildlife and environmental toxicology. To solidify that momentum the Environmental Policy Program will coordinate interdisciplinary policy research and ultimately intends to develop a graduate program emphasis in environmental policy.

Publications

The institute operates a publications program to disseminate the results of its research and public program activities. The institute's mailing list exceeds 18,000 and includes colleges and universities, high school libraries, research institutes, government agencies, private organizations, business corporations and interested individuals throughout the United States and numerous foreign countries. The publications program includes a lecture series, proceedings of conferences and symposia, directories, research and special reports, STI NOTES, and working papers. Publications released during FY '93-94 include the Harris Page Smith Memorial Lectures; four editions of "The Community Leader's Letter;" three issues of "The Economic Situation," a quarterly report written by Bruce Yandle, senior fellow and alumni professor of legal studies; "Nature-Based Tourism Guidelines for Success;" "The Intergenerational Entrepreneurship Demonstration Project — An Innovative Approach to Intergenerational Mentoring" and "Entrepreneurial Mentor-

ship: An Innovative Therapeutic Approach for At-risk Youth and Diverse Older Adults."

Visiting International Scholars Program

The institute offers a visiting International Scholars Program whereby distinguished foreign scholars are brought to the institute for a semester to conduct research. While they are on campus, these international scholars also are afforded opportunities to share their experiences and perspectives with students through lectures, seminars and classroom instruction. Foreign scholars from Australia, Colombia, India, Nepal and the Republic of China (Taiwan) have contributed to this research while guests of the institute.

Undergraduate Studies and Academic Services

The Undergraduate Studies Office is responsible for undergraduate academic programs, service, curricula, academic standards, scholarships and awards, University-wide lectures, new faculty/staff orientation, summer sessions, the Clemson Career Workshops, the Junior Scholars, the Science and Technology Entrance Program, the Prime Time Program, the Calhoun College honors program, Cooperative Education, special post-graduate scholarship programs, University withdrawals and academically deficient students, graduations and special University ceremonial occasions.

In curricular matters, the "general education" component of all undergraduate education is being restudied by faculty committees to ensure that all students are well prepared to deal with the complex challenges of modern life. This should be in place by May 1996.

For the second straight year, the honors program topped 800 members in '93-94. The average SAT score of the 219 new honors freshmen reached an all-time high of 1,285. Ninety-three students graduated with senior departmental honors, including four Calhoun Scholars who were awarded National Science Foundation grants for post-graduate study. The speakers for this year's honors program lecture series include Richard Teresi, founder and editor of *Omni Magazine*; Leon Lederman, 1988 Nobel Prize winner in physics; historian Catherine Clinton of Harvard University's W.E.B. DuBois Institute; and Mary Clark, professor emerita of biology, San Diego State University. The Science and Technology Entrance Program, designed to aid marginal students in agriculture, forestry, textiles and industrial education technology to have meaningful access to Clemson University, has enrolled its seventh class. First to second year retention rates on students who entered in this program are slightly better than those of regular entrants. The first entrants have begun graduating at the rate of 52 percent in five years. The Prime Time Program, a six-week summer bridge program for regularly admitted freshmen who want to get a head start on their college careers, began its first year of operation.

Cooperative Education continues to be a leader in our region. Approximately 600 students participated this year throughout the United States in 1,115 successful work assignments in industry, commerce and government.

A number of students from the Governor's School for Science and Mathematics spent the summer in research projects on the campus at Clemson and at the University's research and education centers located throughout the state. This year, however, saw a significant increase in these students going out of state for college.

The 1993 summer sessions generated more than 45,000 credit hours, (a record high) which is slightly more than last year.

The Clemson Career Workshops continue to be a primary recruiting program for S.C. minority high school students. The University greeted 56 new freshmen recruited by this program to enroll in fall 1993.

The Junior Scholars and Summer Science and Engineering programs bring academically talented students between the ninth and 12th grades for summer enrichment programs on campus. Now in its 12th year, this program enrolled 700 students in summer 1994.

Undergraduate Admissions, Records and Registration and Financial Aid

The '93-94 academic year began with 16,614 students registered for classes — 13,759 full time and 2,855 part time. Of the total enrollment, 4,089 were graduate students.

The College of Education had the second highest collegiate enrollment with 2,934 students. The College of Engineering was first with 3,912 followed by Commerce and Industry (2,713), Sciences (1,866), Liberal Arts (1,709), Agricultural Sciences (1,198), Nursing (794), Architecture (697) and Forest and Recreation Resources (591).

Higher education continued to become increasingly accessible as evidenced by the number of freshmen entering college with advanced standing. In the '93-94 academic year, new high school graduates entered Clemson with advanced standing by means of College Board Advanced Placement courses (688 students, 7,184 credit hours) and by concurrent enrollment in high school and college or enrollment in summer school.

At Clemson, performance in high school has proven to be the best single predictor of success in the freshman year. The class ranks of entering freshmen remained stable, with 37 percent of the class entering in fall 1993 ranked in the top 10 percent of their class, 64 percent in the top 20 percent, and 95 percent in the top 50 percent. The freshman class average Scholastic Achievement Test (SAT) score of 1,052 compared with a national average of 902 reported by the College Board for all high school seniors. Clemson's freshman average of 1,052 also is the highest average among state-supported institutions in South Carolina. Of the 9,535 applications for admission processed for FY '93-94, 5,930 were accepted and 2,770 actually enrolled (freshmen and transfer students).

Clemson students come from all 46 S.C. counties, 47 states, Puerto Rico, the District of Columbia and 70 foreign countries. Residents of South Carolina account for 68.6 percent of the 16,614 students. Greenville County continued to have the most students enrolled (1,790). Anderson County was second with 1,128, followed in order by Pickens, Spartanburg, Oconee and Charleston counties. Most out-of-state students came from Georgia (599), New Jersey (394), Virginia (388), North Carolina (332) and Florida (327).

Computerized early registration helped students get a smooth start for fall classes. Approximately 85 percent registered early and had their course schedules completed before arrival on campus to begin classes.

The enrollment for women at Clemson was 7,360 of which 5,450 were undergraduates. Enrollment of undergraduate women declined for last year, nevertheless for fall 1993 women continue to constitute approximately 44 percent of the undergraduate enrollment.

The Clemson student body receives a significant amount of financial assistance through scholarships and grants, as well as self-help programs such as loans and employment. Excluding donor-selected scholarships, 2,981 scholarships and grants valued at \$5,622,501 were awarded to Clemson students in '93-94. The number of

students receiving Pell Grants was 1,992, with awards totaling \$2,987,463. Clemson University awarded 614 federal Perkins Loans totaling \$689,200. The University also disbursed 6,280 federal family education loans with a total value of \$16,104,172 from a variety of lending institutions. About 56 percent of the undergraduate student body received an estimated \$36.5 million dollars in financial assistance.

Fall Semester Enrollment Comparisons for the Past Twenty Years

Year	Undergraduate	Graduate and Others	Total
1972-73	7,686	2,071	9,757
1973-74	7,910	2,202	10,112
1974-75	8,171	2,415	10,586
1975-76	8,576	2,785	11,361
1976-77	8,620	2,763	11,383
1977-78	8,708	2,566	11,274
1978-79	8,925	2,553	11,478
1979-80	9,291	2,457	11,748
1980-81	9,427	2,152	11,579
1981-82	9,918	2,008	11,926
1982-83	10,151	1,983	12,134
1983-84	10,217	2,242	12,459
1984-85	10,844	2,438	12,926
1985-86	10,434	2,459	12,893
1986-87	10,360	2,702	13,062
1987-88	10,970	2,895	13,865
1988-89	11,774	3,020	14,794
1989-90	12,563	3,509	16,072
1990-91	13,010	3,293	16,303
1991-92	13,285	4,010	17,295
1992-93	13,305	4,361	17,666
1993-94	12,525	4,089	16,614

**Number and Percent of
Black Students**

Year	Number	Percent
1972	179	2.00
1973	211	2.00
1974	216	2.00
1975	338	3.00
1976	307	3.00
1977	336	3.00
1978	290	3.00
1979	341	3.00
1980	305	3.00
1981	325	3.00
1982	429	4.00
1983	472	4.00
1984	528	4.00
1985	671	5.00
1986	714	5.47
1987	690	5.00
1988	789	5.30
1989	1,004	6.20
1990	1,075	6.60
1991	1,240	7.20
1992	1,316	7.40
1993	1,323	7.96

**Average College Board
of Freshmen**

Year	Score
1972	995
1973	982
1974	984
1975	983
1976	996
1977	985
1978	1,000
1979	1,002
1980	1,005
1981	1,007
1982	1,017
1983	1,014
1984	1,012
1985	1,012
1986	1,025
1987	1,028
1988	1,032
1989	1,025
1990	1,035
1991	1,028
1992	1,037
1993	1,052

**Student-Faculty Ratio
(Full-Time Equivalent)**

Year	Ratio
1972	14.6:1
1973	16.8:1
1974	17.9:1
1975	18.3:1
1976	17.6:1
1977	16.3:1
1978	15.9:1
1979	16.0:1
1980	15.6:1
1981	16.4:1
1982	16.6:1
1983	17.0:1
1984	16.1:1
1985	15.4:1
1986	16.9:1
1987	18.3:1
1988	18.9:1
1989	19.7:1
1990	19.8:1
1991	21.2:1
1992	22.2:1

**Number in Freshman Class
(New Students)**

Year	Freshmen
1972	1,919
1973	2,034
1974	1,949
1975	1,901
1976	1,861
1977	1,838
1978	2,020
1979	1,998
1980	2,008
1981	2,284
1982	2,321
1983	2,122
1984	2,188
1985	2,259
1986	2,239
1987	2,818
1988	2,885
1989	2,900
1990	2,513
1991	2,461
1992	2,469
1993	2,301

**Number of Teachers
(Full-Time Equivalent
Teaching Faculty)**

Year	Teachers
1972	614.9
1973	578.4
1974	591.8
1975	602.5
1976	611.3
1977	654.4
1978	675.6
1979	691.8
1980	718.2
1981	709.7
1982	720.9
1983	713.5
1984	762.5
1985	797.3
1986	731.24
1987	713.93
1988	755.48
1989	769.33
1990	791.31
1991	766.34
1992	752.69

**Number of On-Campus Students
in Summer School**

Year	Number
1972	5,232
1973	6,267
1974	5,997
1975	6,275
1976	6,100
1977	6,301
1978	6,393
1979	6,708
1980	6,858
1981	6,897
1982	7,149
1983	7,442
1984	7,418
1985	8,126
1986	8,562
1987	8,446
1988	8,689
1989	9,039
1990	9,873
1991	10,502
1992	10,556
1993	10,425

**Fall Semester 1993 Enrollment by Colleges and Degrees Awarded
December 1992-August 1993**

	Total Enrollment Fall Semester	Degrees					Total
		Associate	Bachelor's	Master's	Specialist	Doctorates	
Agricultural Sciences	1,198	0	144	54	0	16	214
Architecture	697	0	150	78	0	0	228
Commerce and Industry	2,713	0	771	346	0	3	1,120
Education	2,934	0	382	241	9	15	647
Engineering	3,912	0	519	204	0	27	750
Forest and Recreation Resources	591	0	114	19	0	6	139
Liberal Arts	1,709	0	400	42	0	0	442
Nursing	794	0	106	12	0	0	118
Sciences	1,866	0	221	93	0	31	345
Non-Degree	200						0
Total	16,614		2,807	1,089	9	98	4,003

Degrees awarded since 1896 (through August 1993) total 81,902 of which 426 have been associate degrees; 64,259 bachelor's degrees; 15,650 master's degrees; 182 education specialist degrees; and 1,385 doctorates; includes 582 Clemson-Furman MBA degrees awarded May 1972-August 1993.

Water Resources Research Institute (WRRI)

Four research projects were funded during FY '93-94. The title and principal investigator (PI) for each are listed below.

"An Ecologic-Water Quality Model of Lake Marion, S.C: Water Quality and Lake Ecosystem Response to Watershed Changes and Lake Management Alternatives." PI: Dr. Hank McKellar, associate professor, Department of Environmental Health Sciences, University of South Carolina.

- The major objectives of this research are to develop and test a dynamic, simulation model of Lake Marion, based upon an updated synthesis of relevant scientific information on the hydrologic and ecologic functioning of the system; and to use the model to test relevant management scenarios related to wasteload assimilation, land-use changes in the watershed and aquatic macrophyte control.

"Sediment Contamination in Streams and Rivers." PI: Dr. Kevin J. Farley, associate professor, Environmental Systems Engineering Department, Clemson University.

- The objective of this project is to develop computationally efficient solutions and modeling software for evaluating steady-state and time-variable sediment contamination in streams and rivers. One or two case studies (considering a nonpoint release of a pesticide, an industrial point discharge, or the recovery of stream or river from existing contamination in sediments) also will be prepared as part of the study.
- "Development of Waste Load Allocation and Total Maximum Daily Loads for Point Sources and Nonpoint Sources for Complex Estuarine Flow Conditions: Cooper River and Charleston Harbor, S.C." PI: Dr. Jerald Ramsden, Department of Civil Engineering, Clemson University.
- The objectives of this project are to develop linkage programs for the hydrodynamics models being calibrated by the U.S. Geological Survey and the water quality models under consideration by the S.C. Department of Health and Environmental Control; advise the other investigators involved on the appropriate setup of the hydrodynamics model for the harbor; and extend the water quality model into a two-dimensional grid for the harbor.

"Optimum Sizing of Off-Channel Reservoirs Via Simulated Annealing," PI: John M. Shafer, Earth Sciences and Resources Institute, University of South Carolina.

- The goal of this project is to develop a microcomputer-based software package for simulating the operation and optimizing the design of off-channel reservoirs. An existing single reservoir simulation model is being modified to simulate the operation of off-channel reservoirs. Then the simulation model will be linked to an optimization algorithm so that reservoir design and operational parameters can be optimized. A detailed case study demonstration of the model will be performed that focuses on an actual situation in South Carolina where an off-channel reservoir has been built or is being planned.

In addition to the above four projects, additional research was conducted by the WRRI on three projects. 1) Two-dimensional hydrodynamic modeling of Charles-

ton Harbor. This project is supported by the Charleston Harbor Project and the U.S. Geological Survey and is part of a multi-institutional/agency water quality modeling project that has as its goals the development of wasteload allocations and total maximum daily loads for point sources and nonpoint sources in the Charleston Harbor estuary. 2) Riverine sediment and arsenic transport modeling at a U.S. Environmental Protection Agency (EPA) superfund site in New Jersey. This project is being conducted under a cooperative agreement between the EPA and the WRRI. The modeling effort involves simulation of different alternatives for remediation of arsenic-contaminated river and flood plain sediments. 3) In conjunction with the Ohio WRRI, development of a technology transfer program for the U.S. Department of Energy (DOE). This project involves development of a gopher server that will facilitate transfer of technologies from the nation's research universities to the DOE laboratories.

DIVISION OF ADMINISTRATION AND SECRETARY OF THE BOARD OF TRUSTEES

The Division of Administration was created August 1, 1985, in conjunction with the secretary of the Board of Trustees. The fundamental responsibility of this division is to formulate, monitor and coordinate fiscal matters for the Office of the President as well as other areas of University administration. The vice president for administration assists the president in discharging his general administrative and executive functions and represents the president during his absence. The secretary of the board reports directly to the board of trustees. He records all proceedings of the board and its committee meetings, is the custodian of the University seal and all records of the board, and performs other duties as may be assigned by the board of trustees.

The vice president for administration supervises the director of athletics, the director of conference and guest services, the director of human resources and the director of student-athletes enrichment program.

The internal auditor is under the cognizance of the secretary of the board of trustees, who, in turn, is responsible to the board of trustees.

A report on each unit of the division follows:

Athletic Department

Clemson had nine teams ranked among the final top 25 in either the final poll, or NCAA meet/tournament events in '93-94. The highest ranked team was the baseball team, which finished fourth in the final Baseball America poll. The Clemson soccer team advanced to the NCAAs and was fifth in the final poll, the wrestling team was seventh, the golf team was ninth, the men's track team was 11th, the Lady Tiger tennis team was 18th in the final poll, the women's basketball team was 22nd (*USA Today* poll), the football team 22nd (*USA Today* poll), and the men's indoor track team was 24th.

The final Sears All-Sports poll ranked the Clemson all-around sports program 16th in the nation. Clemson's fine spring of top 11 finishes in baseball, track and golf had a lot to do with that fine ranking.

Clemson was outstanding against the nation's best and defeated the number-one team in two different sports in '93-94. The Tiger soccer team defeated number-one

Virginia in Charlottesville on a goal at the buzzer by All-American Jimmy Glenn. The Clemson baseball team defeated Georgia Tech (ranked number one by Baseball America) twice in Atlanta in May. It was just the second time in Clemson history that the Tigers had beaten the number-one team in two different sports in the same year.

Nine different sports that compete in dual meet or match competition had at least one win over a top 25 opponent during the '93-94 academic year.

It was a showcase year for Clemson's facilities. For the first time in history, Clemson played host to NCAA championship events in three different sports. Clemson played host to the volleyball and soccer tournaments in the fall, and the baseball tournament in the spring. Clemson also played host to the women's basketball tournament in 1993, so Clemson has played host to four NCAA tournaments in the last two years.

Clemson had a successful year in football, basketball and baseball, the school's oldest and most traditional sports. Clemson went to post-season play in all three sports and was one of just two schools in the nation to win at least nine football games, 18 basketball games and 36 baseball games. Florida was the only other school in the nation to do it. It was just the eighth time in Clemson history and the first time in five years that Clemson has been to post-season play in all three of its oldest sports in the same academic year.

All but two of Clemson's teams had what would be termed a winning season, and five of the teams that participate in head-to-head competition won at least 70 percent of their games.

The Clemson football team posted a 9-3 record and was ranked 22nd in the final *USA Today* poll. It is the seventh time in the last eight years that Clemson has been ranked in the final top 25 poll. Clemson is one of just seven schools who have been ranked in the final poll seven of the last eight years. The other schools are Miami (FL), Nebraska, Michigan, Texas A&M, Florida State and Notre Dame.

The Clemson baseball team reached the number-one ranking on May 2, 1994, the first time in Clemson history that the baseball team was ranked number one by itself. (Clemson was tied for first in a poll during the 1977 season.) Clemson held the number-one ranking for four weeks in May and led the nation in total victories with 57. The 57 wins included 19 wins over top 25 teams, a Clemson record for one season regardless of sport. Jack Leggett's team won the regular season and ACC Tournament. Leggett was named ACC Coach of the Year.

The men's track team once again had the most All-America selections. Coach Bob Pollock's team had five All-America selections in indoor track and five in outdoor track.

Clemson's volleyball team had a landmark season as it was chosen for the NCAA Tournament for the first time. The team finished with a 27-8 record, which tied for the highest winning percentage of any Clemson team in '93-94. Robbin Kibben was a first-team All-ACC performer.

The Clemson golf team advanced to the NCAA national tournament for the 13th straight year, one of only four schools in the nation who can make that claim. Clemson is one of just three programs to rank in the top 15 at the NCAA Golf Championship for seven straight years.

The women's basketball team advanced to the NCAA tournament for the seventh straight season, the second longest string of NCAA appearances among Clemson sports and the longest active streak among women's sports at Clemson. Jim Davis was named ACC Coach of the Year.

Individually, Sam Henson had the standout individual accomplishment among Clemson athletes in '93-94 as he won his second straight NCAA wrestling championship. Henson completed his Clemson career at the 118-pound category with a perfect 71-0 record.

Two Tigers led the nation in individual categories. Clemson soccer player Jimmy Glenn led the nation in goal scoring, just the second Clemson soccer player in history to lead the nation in scoring. Shane Monahan was a first-team All-American on the baseball diamond, and he led the nation in total hits with 137. He was just five hits away from the all-time NCAA record. Monahan hit .415 for the season and was the MVP of the ACC Tournament, which Clemson won in Greenville, S.C. Teammate Mike Hampton also was a first-team All-American.

Mark Swygert finished in a tie for third at the NCAA golf tournament in June and earned All-America selection. It was the second straight year that Swygert finished in the top 10 at the national event, the first Clemson golfer in history to do that.

Offensive guard Stacy Seegars was chosen a first-team Associated Press All-American and appeared on the Bob Hope Christmas Special. It was the second straight year Seegars had been chosen to an All-America football team.

Men's basketball player Sharone Wright was a second-team All-ACC selection and led Clemson to the quarterfinals of the NIT. Wright, who ranked in the top 20 nationally in rebounding and blocked shots, was the number six selection of the NBA draft, the highest selection in Clemson history.

Clemson hurdler Duane Ross was an All-American in indoor and outdoor track and had the fastest time in the world in the 110 high hurdles. Women's basketball player Jessica Barr brought much attention to the Clemson women's basketball program. She became Clemson's first Kodak All-American in 12 years and was named the MVP of the ACC. She was honored as the female athlete-of-the-year in the state of South Carolina.

Boba Tzvetkova reached the final eight of the NCAA women's singles tournament and earned All-America honors. She was ranked 17th in the final NCAA singles poll released on June 15.

It also was a standout year academically as 57 student-athletes were named to the ACC Academic Honor Roll. Clemson football player Warren Forney was the recipient of the Algernon Sydney-Sullivan Award, one of the top honors bestowed upon a Clemson student. It is presented for service to others.

Jaro Zawislán won the ACC's Jim Weaver Award as one of the top all-around student-athletes in the ACC.

Department of Conference and Guest Services

- Served in a lead position in the development, construction and management of the new Continuing Education Center and Golf Course. We assumed the responsibility of managing the golf membership, raising gifts and financial support for the project and served as the University contact for this initiative.
- Hosted the Educational Testing Service (ETS) Advanced Placement Reading in June for the disciplines of mathematics, computer science, German, government and politics, psychology, biology and physics. There were 958 faculty from every part of the nation who evaluated more than 217,000 student tests. In addition, this activity provided approximately 180 temporary jobs for local school teachers.
- Hosted 113 conferences at Clemson during summer 1994. This brought 12,429 guests and total gross revenue to the University of \$1.5 million.
- Continued to serve as the meeting center on campus, hosting 186 events and 335 academic groups in seven function rooms in the Clemson House.
- Installed two floors of new student furniture in the Clemson House residence hall rooms.

- Was responsible for the registration, meeting planning and fiscal management for the Kennedy Center's American College Theater Festival (600 plus participants), which was hosted on campus.
- Met its goal of strengthening its overall financial reserves by maintaining current departmental reserves.
- Rewrote the vision and mission statement to reflect the role of this department within the current direction of the University.
- Assumed institutional responsibility for the FY '94-95 United Way Campaign.
- Hosted 10 Elderhostel events bringing more than 320 adults to Clemson for the first time.
- Hosted the State Budget and Control Board Executive Institute.
- Hosted the S.C. Academic Program for Alcohol and Drug Studies.

Human Resources

The Office of Human Resources coordinates and directs the University's affirmative action efforts and desegregation plan. The department is actively involved in recruiting black faculty, staff and graduate students, mediating grievances based on alleged illegal discrimination, conducting an educational and counseling program for sexual harassment, compiling statistical reports for state and federal agencies, and developing projects to meet the objectives of equal opportunity and desegregation.

For academic year '93-94, the University had 43 blacks with academic status, including five administrators. This represents an increase of one black administrator and a decrease of one nonadministrative faculty. Black nonacademic administrative staff increased to 14. Black graduate students increased from 191 to 193 in 1993.

In overseeing the University's compliance efforts for the Americans with Disabilities Act, an audit of campus facilities was undertaken to ascertain the accessibility of programs and services offered at Clemson. This information will be used to develop a transition plan for barrier removal.

In addition, \$21,000 was spent on the purchase of assistive technology to aid individuals with disabilities. This equipment includes: a machine that reads to the blind or visually impaired, sound amplification systems, telecommunication devices for the deaf, and computers equipped with scanners, voice synthesizers, voice recognition and large print capabilities. These devices will greatly enhance the opportunities and participation of disabled faculty, staff and students.

Vital Issues: Plight of the Black Male in South Carolina was established by the Office of Human Resources to identify and address the problems which affect the status of black males in health, education, crime and economics. It began in 1991 after a series of conferences made evident the need for Clemson University to increase its involvement in the black community. During '93-94 Vital Issues increased its efforts through the following:

- Sponsored conferences and facilitated "speak-outs" at various public schools around the state for parents and students, along with school personnel, to obtain different viewpoints and opinions.
- Sponsored a one-day field trip for first through fifth graders from Homeland Park Elementary Summer School in Anderson County to introduce these students to a college campus. This project was so successful that, later in the year, the entire fifth grade from Centerville Elementary School was invited to visit campus to participate in special college minicourses taught by Clemson faculty.

- An after-school enrichment program at Southwood Middle School in Anderson County has existed for two years. In response to a call for assistance from the principal at Centerville Elementary School, OHR helped to develop an adult/youth mentoring program for that school. In Pickens County, OHR assisted in the establishment of an after-school tutoring program at D.W. Daniel High School utilizing Clemson University students as tutors.
- Successfully drafted and lobbied for passage of legislation to create S.C.'s first Commission for Minority Affairs. This commission, with its program clearinghouse and statistical assistance, will become a major force for efforts statewide.
- Hosted the National Youth Sports Program, a five-week day camp, from June 6-July 8, 1994, at Clemson University. Funding was secured from the NCAA along with support from the Anderson United Way, Anderson Urban League, NationsBank and Anderson School District Five. More than 300 economically disadvantaged youth (ages 10-16) attended. Children received two free meals a day, a medical examination, sports instruction and participated in various enrichment activities.
- Assisted in the development of "Promoting Success for At-Risk African-American Youth." This program has received funding through the Department of Social Services to begin the first year of a four-year project. It is a research project to determine criteria necessary for success in "at-risk" African-American youth, to create a clearinghouse for programs in the Up-state and to evaluate existing programs for effectiveness in working with African-American males.
- In an effort to increase the involvement of Clemson University's faculty, staff and students, OHR prepared and distributed a survey/questionnaire designed to establish a data base of volunteers to assist community organizations and groups.

Internal Auditing

The staff of the Internal Auditing Division consists of eight members: an associate vice president, an audits manager, an EDP audits supervisor, an audits supervisor, an EDP auditor, a staff auditor, a business manager and a half-time administrative specialist. The associate vice president reports administratively to the secretary of the board of trustees and functionally to the audit committee of the board.

The division provides an ongoing, independent audit function for the University as a service to management. Audit parameters include financial, compliance and operational reviews, as well as special requests.

Student-Athlete Enrichment Programs

Major accomplishments for '93-94 include:

Academics

- The Student-Athlete Enrichment Programs have experienced significant improvement in the area of academic progress. A total of 234 student-athletes made the honor roll, which is the second largest number since

Vickery Hall implemented its comprehensive programs to address student-athletes needs and transitional issues.

- At the end of the spring semester, the average GPA for all student-athletes was 2.51 and 2.47 for scholarship participants.
- One hundred percent of the WICAT (World Institute of Computer Assisted Teaching) participants significantly improved reading and math skills which enables them to be competitive in the academic arena. This program targets special admit student-athletes who have marginal SAT/ACT test scores, and the program provides supplementary instructions to address deficiencies.
- Only 24 upperclassmen will enter the fall of 1994 below a 2.0 grade-point-average. This is a drastic improvement considering past performances.
- The NCAA graduation rate submitted in January 1994 reflects that 84 percent of all Clemson University student-athletes who have exhausted their eligibility have graduated in a five-year period. The graduation rate for football has improved 12 percent, from 44 percent in 1993 to 56 percent in 1994.
- For two years in a row, an in-service tutorial training program was instituted for tutors, which made a great impact in eliminating communication barriers between tutors and student-athletes. Students also are bonding more than ever before. This program has improved the overall delivery of service in the area of academic support.

Personal Growth and Development

We have implemented freshmen programs for student-athletes which address subjects such as nutrition, eating disorders, time management, sexually transmitted diseases, academics, careers and many other areas that will enlighten our student-athletes and address their personal needs. These programs have been very effective in front-loading freshmen in their transitional period.

In May 1994, after one year of implementing the Speaker's Bureau, Clemson's student-athletes spoke to more than 10,000 high school and elementary school students. The Speaker's Bureau was established for student-athletes to share their athletic experiences, convey the demands of competing on the Division I level and to change the public perception of the student-athlete. These engagements allow student-athletes to give back to the community in a self-service roll and to enhance interpersonal skills.

Clemson's Athletic Department was targeted as a peer mentoring program to implement the NCAA Champs program (challenging athletes minds for personal success). Champs focuses on five areas of commitment: athletics, academics, career, self-service and personal development. The NCAA has established essential components in these five areas that challenge athletic programs to standardize certain components that need to be emphasized in athletics.

Career Assistance Program

The job program has gotten off to a great start with the implementation of a career suite to network potential employers of student-athletes for summer employment and long-term employment after graduation. This suite is hosted by Bill D'Andrea at each home football game. This allows potential employers to become familiar with our programs and student-athletes.

The Student-Athlete for Career Advancement organization comprises all student-athletes interested in making advancements in their careers. Student-athletes interested in meeting employers and discussing job opportunities are invited to visit the suite before home games.

The SAFCA sponsors two meetings a month to hear representatives from the private sector, provide direction on resume writing, interviewing techniques and

guidance to enhance the student-athlete's skills in seeking employment. In addition, Clemson University student-athletes use the placement office, career center and faculty to focus on career goals and aspirations.

BUSINESS AND FINANCE

Today's environment of eroding support and resources for higher education requires the business organization to expand on the traditional role of control. Business organizations must use creativity and innovation to devise operational methods with sound internal controls, but which are flexible enough to ensure timely and cost-efficient support services are provided. These methods will emphasize front-line decisions and fiscal responsibility and will require both organizational and individual integrity.

The reality of today's environment is reflected in the \$1.7 million budget cut Business and Finance will absorb to meet the University's budget initiatives. Business and Finance has eliminated 54 positions, 36 funded by education and general funds and 18 funded by various auxiliary enterprises. The cuts focused on reducing organizational layers and administrative positions instead of eliminating front-line employees and services.

Many of the activities described in this '93-94 annual report reflect the growth of this modern business organization and the Business and Finance commitment to reducing administrative costs by simplifying and streamlining processes. The Departmental Credit Card and the Career Path Program are prime examples of innovative and creative solutions to modern problems. The Departmental Credit Card is a joint venture with American Express to develop a true corporate procurement card. Individual cards are supplied to departments to expedite small purchases (under \$1,500). Departments benefit from being able to finish the transaction quickly, and the University realizes substantial savings by only having to issue one check per month to American Express. The Career Path Program is a creative approach to the problems of employee advancement and training. The Career Paths (the Facilities Maintenance and Operations Career Path is in operation while the Administrative and Business Services Career Paths are being designed) clearly define the required training and skills necessary for promotion. Employees will be promoted, unless a vacancy is required, upon completion of the training and skills requirement.

To promote organizational and individual integrity, Business and Finance developed and adopted an ethics policy. The policy outlines the ethical responsibilities of the organization to the employee and of the employee in business dealings with others, both inside and outside of the University. Organizational integrity also is reflected in the University's internal controls. Business and Finance continuously monitors policies and procedures to ensure adequate internal control.

Another facet of organizational and individual integrity is a respect for cultural diversity. Business and Finance is committed to establishing a talented and diversified workforce emphasizing fair and equal treatment, respecting diversity, recognizing employee contributions and encouraging both personal and professional development. The Business and Finance Human Relations Council has been established to promote these values and to direct the activities of the diversity program.

The Business and Finance Strategic Plan identifies five critical areas which transcend divisional and departmental boundaries. These areas — strategic plan-

ning, quality and leadership, governmental relations, environment and internal control — are emphasized as targets for organizational improvement.

This '93-94 annual report presents Business and Finance accomplishments for the emphasized areas and the functional divisions of the organization.

Role of the Business Organization

By tradition, the role of the business organization in higher education suggests control. Today, responding to constant changes and challenges in higher education, there is an added dimension to the management of the institution's business and fiscal affairs. Management skills must be more diversified, more integrated with the academic programs, yet more outwardly focused on the challenges, threats and opportunities of the environment and marketplace.

The primary responsibilities of the business organization are to provide leadership, manage the business and financial affairs of the institution, and keep the chief executive officer and the governing board apprised of the institution's financial condition.

In addition to providing leadership, the business organization must:

- Develop and recommend broad policies.
- Ensure strategic and operational plans are developed and articulated.
- Create operating systems for business functions.
- Select, train, manage and develop personnel to effectively carry out these functions.
- Design and implement appropriate evaluation procedures.

Given the complexity and scope of the contemporary research University, management leadership fully supportive of the academic plan and its goals is essential. Important characteristics of a business organization within higher education are:

- A continuing, visible commitment to education and service and to the mission of the institution.
- An accurate perception of reality. Drawing heavily on internal and external information networks, both good and bad news must be relentlessly pursued to ensure decision support systems are based on the realities of the total environment and the marketplace.
- Team-building skills and attitudes. It is essential that both the employees and the business organization as a whole reflect a team-building attitude. The organization must encourage open and honest communications projecting a high degree of trust and candor and a low degree of defensiveness.
- Business personnel are responsible for training subordinates to become better managers by building positive self-images through delegation of responsibility, career path-oriented development programs, regular discussion sessions and letting staff represent the institution with outside contacts. Leadership within the organization should encourage well-calculated risk-taking and decision-making.
- The greatest continuing challenge is to look outward rather than inward. Given the conservative nature of the academic enterprise, the institution must be pulled into the future through an alertness to new developments and a reaching out in new directions. Business functions must be dynamic and active, rather than reactive. Ultimately, visions of the future must be translated into action plans which are communicated widely and effectively.

- Knowledge of costs and the ability to control them are essential. Given the inevitable need for additional resources which always are in short supply, cost efficiencies to free up dollars must be part of the strategy.
- Integrity and high ethical standards. Without integrity there can be no trust. Integrity implies an integration of values, and an acceptance of others' differing views. Actions and words best communicate a business organization's values, beliefs and ethics. Fairness and honesty are essential ingredients of integrity.

Continuous work in developing these characteristics, while no guarantee of effectiveness, helps provide a solid foundation for coping with extensive pressures, for meeting the many challenges and for taking advantage of the many opportunities of business organizations within higher education.

Business and Finance Ethics Policy

Clemson University has established an outstanding reputation for honesty and fairness in conducting its business operations. This reputation, built through the dedication of University employees for more than 100 years, is a fragile trust and can be maintained only through strict adherence to the highest institutional and individual ethical standards.

Clemson University is obligated to provide employees with a work environment free of all forms of discrimination, harassment and physical or verbal abuse, and to supply the information and resources, including safe, well-maintained work areas, required for successful job performance. Employees are entitled to complete, fair and timely performance reviews and job planning sessions. The University should provide access to educational and professional development programs and encourage all employees to develop the personal and professional skills necessary to enhance job performance and increase opportunities for promotion.

Employees are obligated to perform their duties according to the highest legal and ethical standards. Ethical standards and appropriate disciplinary actions for Clemson University employees are outlined in the State Ethics Act, the *Clemson University Fiscal Policies and Procedures Manual*, the *Clemson University Personnel Policies and Procedures Manual* and the *Clemson University Staff Handbook*. Employees, however, frequently are forced to make moral and ethical decisions based on their best judgment. These decisions usually are obvious, but situations can occur where personal or job expediency obscures moral and ethical considerations. The following statements will serve as a guideline when ethical questions occur.

Legal Issues

Clemson University employees should follow both the letter and the spirit of the laws and regulations of the state of South Carolina and Clemson University. Federal laws, including restrictions on the use of copyrighted and patented materials, also must be observed. Questions on legal matters should be directed to University legal counsel.

Work Environment

Public perception of Clemson University is greatly influenced by the actions of University employees. The conduct of employees on the job must be marked by integrity and fairness in business relations with people both internal and external to the University. Clemson University has great respect for personal privacy. However, employee actions on and off the job may become a legitimate concern of the

University if the employee's performance, the performance of other employees, the life, health and safety of other employees, or the interests of the University are adversely affected.

Employees are expected to actively participate in creating a work environment free of discrimination or harassment of any kind. The University will not tolerate, under any circumstances, slurs, comments, jokes or any other conduct contributing to a hostile work environment. Staff and students should not suffer discrimination for race, creed, color, sex, age, religion, national origin, ancestry, marital status, veteran status or handicaps unrelated to a person's ability to perform his or her job responsibilities. Additionally, sexual advances, either physical or verbal, or any other conduct in the workplace which, in the opinion of Clemson officials, creates an intimidating or offensive work environment will not be tolerated. Complaints of any such activity should be directed to the Human Resources Office.

Physical and verbal abuse, threats and the sale, possession and distribution of illegal drugs or controlled substances, except for medical drugs prescribed by a physician, are forbidden. Employees under the influence of such drugs, substances or alcohol are a danger to themselves and other employees and should not be in the workplace.

University employees are expected to perform University-related work while on University time. Employees are expected to work productively and not abuse University time. Abuses of University time include misrepresentation of time worked, overtime hours, sick days or vacation days. Performance of personal tasks or having employees perform personal tasks or work unrelated to the business of the University also is unacceptable.

University Property

Clemson University expects all employees to protect the University's assets. These assets include physical property, monetary assets and proprietary information. Employees should guard against the loss, theft or misuse of University property and should report any such incidents to the University Police and their supervisor or other appropriate authority. University policy explicitly forbids the use of equipment or supplies purchased with University funds for personal needs.

University personnel regularly handle large sums of cash and checks. Theft or misuse of these funds is subject to immediate disciplinary action, including possible dismissal and criminal charges. Misrepresentation of travel expenses including reimbursement claims for meals not eaten, miles not driven or other expenses not actually incurred during official University travel, also are considered misuse of University funds, as is the failure to observe regulations concerning the use of University vehicles.

Conflicts of Interest

State and University policies on conflicts of interest are included in the *Clemson University Fiscal Policies and Procedures Manual*, the *Clemson University Personnel Policies and Procedures Manual*, the *Clemson University Sponsored Programs Policies and Procedures Manual* and in the *Clemson University Staff Handbook*. To avoid even the appearance of a conflict of interest, employees should never accept duties, gifts (state regulations allow acceptance of gifts valued at less than \$10), favors of monetary value, incur obligations or participate in any business or activities, either professional or personal, when a conflict exists or appears to exist, between the individual's interests and the best interests of the University. Employees should immediately notify their supervisor if a conflict of interest occurs.

Vendors seeking to do business with the University are entitled to fair and open competition. Employees and their families should not solicit or accept gifts or

services which may be construed as influencing future business dealings, nor should employees develop special relationships or give preferential treatment to any vendors.

Empowerment

Business and Finance is a service organization. Supervisors are expected to create and maintain a service-oriented environment. To provide the best and most responsive service, employees should have the freedom to act decisively in their area of expertise. In such an environment, honest mistakes will sometimes occur. Supervisors should treat errors as learning experiences and be careful not to over-react to errors. Supervisors also must be aware of, and refrain from, placing employees in unethical or illegal situations.

Conclusion

Business and Finance staff represent Clemson University in daily contacts with students, parents, vendors, the general public and government officials. The integrity of the institution is at stake in all of these contacts and in every personnel and procurement decision. It is imperative that all staff conduct their activities with the highest ethical standards to maintain Clemson's reputation. In questions of ethics, the employee's conscience should be the first guide. Additional assistance may be obtained by consulting a supervisor. If questions still remain, the "Ethics Test" developed by Kenneth Blanchard and Norman Vincent Peale in *The Power of Ethical Management* listed below should help answer them.

The "Ethics Check" Questions

Is it legal?

Will I be violating either civil law or company policy?

Is it balanced?

Is it fair to all concerned in the short term as well as the long term?

Does it promote win-win relationships?

How will it make me feel about myself?

Will it make me proud?

Would I feel good if my decision was published in a newspaper?

Would I feel good if my family knew about it?

Strategic Planning

The Business and Finance commitment to strategic planning is demonstrated in the *Business and Finance Strategic Plan*. The plan details long-term (strategic) and short-term (tactical) goals and objectives designed to establish an efficient, service-oriented organization. These goals and objectives are presented for the five areas targeted for organizational improvement and for the functional divisions of Business and Finance.

Business and Finance continues to improve the integration of operational, facility and financial planning. The *Campus Master Plan* and the *University Financial Plan* continuously are updated to reflect the goals of the University's strategic plan.

Quality and Leadership

Essential to achieving the mission of the organization through execution of the Business and Finance Strategic Plan is a program of self-evaluation and non-traditional thinking to change the organization's culture, increase the focus on quality issues, and develop methods of controlling and reducing costs. This effort, the Business and Finance Continuous Improvement Process, has unfolded in a number of phases, some of which overlap.

Phase 1

The effort was jump-started with the Business Systems Study, a review of administrative computing systems, and the definition of requirements for new computer systems by Deloitte & Touche. In addition, Deloitte & Touche reviewed the Business and Finance organization, detailing recommendations for improvement for efficiency and cost containment. The review, completed in 1991, resulted in national recognition with a National Association of College and University Business Officers (NACUBO) cost-reduction incentive award. In addition, external peer reviews have been initiated in a variety of areas including food service operations, laundry operations and the facilities area.

Phase 2

To improve morale and communication, four advisory councils to the vice president were created, each with a specific role.

Quality and Leadership — Reviews quality initiatives including consultant reports, assessment progress, information technology upgrades, implementation progress of business systems projects, quality task force recommendations and benchmarking analysis.

Employee Relations Council — The ERC provides a conduit for information between front-line employees and the vice president for business and finance. Representatives are elected by their peers to discuss and recommend solutions to employee relations problems.

Human Relations Council — Advises the vice president on minority and women's issues in Business and Finance. The council will develop surveys, promote programs and form a subcommittee to study individual concerns.

Secretarial Advisory Council — Provides a forum for Business and Finance secretaries to express concerns and opinions on policies and procedures.

In addition, a major change in the culture of the organization from an employee perspective is being achieved through the creation of the Career Path Program that links compensation with employee development and allows employees to influence both their compensation and their classification. The program also has facilitated improvements in communication and the evaluation process.

A detailed and flexible training program is essential to the success of the Continuous Improvement Process. Employees will need extensive training to adapt to new computer technology and systems in addition to the needs of the Career Path programs. Numerous training sessions have been developed to improve employee knowledge of processes and procedures. Additional sessions are being presented to support the team building, leadership and decision-making skills required by a quality oriented organization. Employee enrichment is encouraged through various

professional development programs and the apprenticeship and GED/Literacy programs.

Employee recognition programs are an integral part of the quality initiatives for Business and Finance. Employees were recognized for extraordinary performance through formal recognition programs including:

Employee of the Month — This award recognizes both outstanding personnel in a particular month and, when appropriate, the long-term excellent service of employees based on diligence, pride in their work, cooperation within the department, their courteous manner in business dealings, outstanding quantity and quality of work, and initiative shown in promoting improvements in service or cost effectiveness.

Recognition includes both individuals and small groups. Recipients are notified in writing concerning their award with a copy placed in their official personnel file. In addition, each recipient will receive an individual "Employee of the Month" award and his/her name will be imprinted on the "Employee of the Month" plaque on display in the vice president's office. There will be an annual luncheon to recognize award recipients and the annual *Kudos* newsletter detailing all of the individuals or groups receiving recognition during the year.

Merit Award — Awards are presented during the fall and spring semesters. These awards recognize effort or service beyond the expected level of performance and include a review of past achievements. The recipients receive a certificate and are recognized at Business and Finance administrative retreats. Criteria include explanation of performance qualities meriting recommendation for this award, how the employee's performance benefits the organization of the University, initiative shown by the individual, and how the employee works towards achieving the goals of the work group. Recipients are included in the annual luncheon and the *Kudos* newsletter.

Group and Team Awards — On occasions when recognition of a department or large group of employees is necessary, a special group award will be given. A departmental plaque will be presented, and the group will be included in the annual luncheon and the *Kudos* newsletter.

This area currently is being reviewed to incorporate a bonus program for exceptional performance.

To facilitate communication, a number of cross-functional committees were created. These committees were composed of a broad cross-section of employees who provided advice to the vice president on various policy issues. The committees addressed a variety of subjects including:

- Quality and Leadership,
- Accounting and Business Standards,
- Business Services,
- Classification and Compensation,
- Facilities,
- Financial Planning,
- Investments,
- Human Resources,
- Compliance and Cost Standards,
- Computing and Information Management, and
- Privatization.

As the cross-functional character of the committees became part of the organizational culture, further economies have been achieved by reducing the number of committees to three covering:

Accounting and Business Standards Advisory Committee — Review accounting, audit and unrelated business income issues, and standards of the University and its related organizations. The committee also reviews audit reports for policy issues and implementation.

Business Services Advisory Committee — Advises on the activities and direction of Business Services and is composed of faculty, student, staff and Clemson Chamber of Commerce representatives.

Computing and Information Management Advisory Committee — Focuses on policy and long-range computer issues within Business and Finance. Monitors campus computing trends and activities, including telecommunications, to determine their impact on Business and Finance.

Phase 3

Fourteen “quality-driven guided experiments” were initiated as part of the Continuous Improvement Process. Task forces examined processes by defining each process, flowcharting the process, identifying improvements and selecting benchmarks to monitor and evaluate the process. Task forces covered the following processes.

Work Order Process — A review of the Facilities Maintenance and Operations process of providing repair and renovation services to departments. Jobs were followed from inception in the department through to completion by Facilities Maintenance and Operations including all related accounting entries. Eighteen recommendations were developed to improve the processes and appropriate action has been taken of 15 of the recommendations.

Travel Process — Includes the entire travel related process from the decision to make a business trip to reimbursement of expenses from the trip. The task force made 12 recommendations for improvements, and 10 of the recommendations have been implemented.

Employment Process — The entire employment process from the decision to request a new position through hiring a new employee and putting him/her on the payroll. The employment application process, grievance procedures and employee orientations also were considered. The task force developed 26 recommendations, and action has been taken on 18.

Purchase Order Payment Process — The sequence of transactions from the purchase of goods through payment to the vendor. Thirty-five recommendations were made by the task force, and 23 have been implemented.

Registration Process — Initiated through a joint effort between Student Affairs and Business and Finance, this task force studied the process of registering students.

Cash Management — This task force examined issues related to cash management strategies. Specific areas included centralized receiving of all cash, security of cash, the impact of centralized cash receiving on related organizations and a

strategy to maximize interest income for the University. Forty-five recommendations for improvement were made by the task force. Business and Finance is currently considering the implementation of these recommendations.

Travel Management — This task force resulted from a recommendation by the Travel Process Task Force and reviewed the University's approach to travel planning and controlling travel costs. The task force developed recommendations to improve the quality, efficiency and effectiveness of the University's travel process. Recommendations are in the process of being implemented.

Certification Process Design — This task force designed the framework for the certification process. Certification was recommended by the Purchase Order Payment Task Force to streamline the document review process. Under the recommended process, departmental personnel receive professional training in a process. Upon successful completion of the training, the department performs the process with Business and Finance performing only a minimal review. Facilities Maintenance and Operations has been certified for the accounts payable process.

Establishing a positive working environment for employees is necessary if the organization's culture is to be refocused for front-line decisions. Guidelines and rules must be clearly stated, and employees must receive extensive training in processes and procedures. Guided experiments designed to have a positive impact on the working environment are:

Business Ethics Guidelines — The task force developed an ethics statement, created an Ethics Advisory Committee and recommended distributing a memorandum to all Business and Finance employees outlining the organization's ethics philosophy.

Business Work Rules Guidelines — All work rules and standards in Business and Finance were reviewed, and recommendations were made for the consistent application of the rules and standards.

Career Path Task Forces — Three task forces have been formed to develop career paths for Business and Finance employees. Career paths will be created for trades workers in Facilities Maintenance and Operations, Business Service's personnel and administrative employees. These career paths will clearly outline the skills and training required for each employee to be promoted to the next level. Career paths will demystify the promotion process since employees will know precisely what needs to be done for advancement.

Position specifications and training requirements were drafted for positions in Facilities Maintenance and Operations and approved by the Department of Human Resource Management. The approval delegates to Clemson responsibility for administering the Career Path program which was implemented on July 1, 1993. Task forces for Business Services and Business and Finance Administration have started designing the frameworks for the Career Paths.

Periodic reports are prepared detailing progress toward implementation of the various recommendations. The *Business and Finance Productivity Study 1993-94* details benchmarks and progress to date. Savings campuswide probably exceed \$500,000 annually. Business and Finance also achieved noticeable improvements in the quality of financial reports and audit findings. These improvements were recognized with the award of the Government Finance Officers Certificate of Achievement for Excellence in Financial Reporting for the University's *Component Unit Financial Report*. Clemson is the first public college or university in South

Carolina to receive this certificate. The organization also has been recognized through other awards and the delivery of papers at national meetings.

Phase 4

Given that the task force phase was perceived as top down in terms of setting the agenda, it became important to push the quality effort down into the organization. This has been accomplished using a variety of tools at the discretion of each division within Business and Finance.

Phase 5

The emphasis will be on a "value-added approach" whereby Business and Finance will produce significantly more in value for each dollar invested in the organization's activities through improved productivity and the use of external partnerships. Services have been evaluated to determine those that are essential vs. only desirable. Services that are only desirable will be sacrificed so that essential activities can receive sufficient resources to execute the function effectively.

Services which duplicate the campus departments because of a perceived need for special services will be phased out. Such problems need to be addressed directly instead of building up redundant systems. Another criteria involves the customer base. If a particular service benefits a large cross section of the campus, it probably should be continued in a cost-effective manner. However, if a service benefits only a small portion of the campus or appears to be outdated, it will need to be eliminated.

The reduction required in administrative costs can be achieved only if specific productivity deficiencies are identified and dealt with directly, including deficiencies in performance by individuals in the organization.

The "value-added approach" builds upon the foundation created by the Continuous Improvement Program by maximizing outcomes given the financial and computing resources available. Finally, the evaluation matches the organization's strategic objectives with the needs of Clemson University.

Phase 6

The next logical step is to determine if such essential services are being delivered in a cost-effective manner using an aggressive benchmarking process. The effort will involve two major components:

- Certain Business and Finance operations are best analyzed using the cost analysis and "best practices" detailed in the publication, *NACUBO Benchmark 93: Operational Benchmarking for Cost Management and Quality Improvement in Higher Education*, recently compiled by Coopers & Lybrand with Barbara S. Shafer & Associates. In many of these cases, the best course of action in terms of reducing future costs and improvements in reporting and executive information is to upgrade existing information systems.
- Benchmark comparisons will be made to organizations that can provide the service to Clemson University in the form of a partnership more commonly referred to as outsourcing or privatization. Once the comparison has been validated the impacted department will have an opportunity to respond to the proposal, thereby ensuring a competitive cost structure. The purpose is to provide services at competitive costs. However, privatization will not be ruled out if, after a fair and open appraisal, it benefits Clemson University.

Firms considered for comparative purposes or eventual privatization should be "significant" in terms of their resources and competitive advantages. This is essen-

tial if the institution is to build a long-term partnership that can be relied upon. A "significant" firm will be better able to provide employment for employees displaced by the privatization decision.

If the benchmarking review indicates that privatization should be considered, *Contract Management or Self-Operation, A Decision-Making Guide for Higher Education*, a booklet sponsored by The Council of Higher Education Management Associations, provides an assessment of the positions taken by the proponents and detractors of this concept in higher education.

Supporters see it as a way to shed headaches, stabilize or increase income, control or lessen expenses and to concentrate on the core mission of education by leaving the provision of services to the external companies who are best equipped to provide them. Detractors see it as a loss of institutional control, less responsive service, higher costs to students, displaced employees, an erosion of the institution's identity, lack of understanding or support for the mission of the institution, and at best, a short-term gain that will be more than offset by long-term losses.

Partnerships with entities within the institution also are another source of creative cost reductions. Potential examples include Architecture, Engineering, Commerce and Industry, DCIT and Student Affairs. Partnership opportunities also exist relative to other universities through partnerships and teaming to accomplish tasks and provide evaluation expertise.

As the process has developed, the organization has attempted to emphasize three areas, safety and environmental health, fiscal integrity and the infrastructure problems of the institution both from a regulatory perspective and a facilities perspective. Business and Finance also has attempted to promote values within the organization that emphasize integrity, a positive work environment and improved human relations. Business and Finance also has promoted flexibility in terms of work schedules and office hours to better facilitate service to the various customers served by the organization.

The resulting organization will continue to provide essential services utilizing a combination of University-provided services and partnerships.

Environment

An Environmental Committee has been established to review issues involving the University and the environment. Three subcommittees were formed to review specific areas in detail:

Reduce, Reuse, Recycle — focuses on issues involving the recycling program, energy conservation, chemical utilization, waste treatment and removal, and vehicle fuels.

Construction and Infrastructure — studies issues related to building design, power plant, transportation systems and bike paths.

Safety and Environmental Health — Reviews problems of hazardous and radioactive materials, building environment, stormwater discharge, compliance and monitoring, training and education.

Environmental issues are a major part of Clemson University's future, both academically and operationally. Printing Services now offers more recycled pro-

ducts including envelopes, coated stock paper and coverstock paper available in both white and color with soybean ink. The recycling system for wastepaper and printing supply by-products was improved.

Clemson University dedicated a new recycling center during the past year. The center is a joint effort of Facilities Maintenance and Operations, two student organizations, the Zoology Department and Wal-Mart. The Zoology Department donated space in the Zoology Field Station to provide offices for the Recoiling Department, the Student Recycling Commission, Students for Environmental Awareness and storage space for recycling supplies. Wal-Mart donated four 30 cubic-yard recoiling containers and the Student Recycling Commission received grant money for the purchase of a John Deere all-terrain vehicle for the collection of recyclable products.

Governmental Relations and Communications

Working with other members of the campus community, Business and Finance personnel helped enhance relationships with a variety of Clemson University constituencies. Members of Business and Finance cooperated with other college and university leaders in efforts to obtain regulatory relief from the state Legislature. The resulting law took effect on July 1, 1994, and is designed to reduce administrative costs and allow colleges and universities to operate more efficiently while maintaining high standards of accountability. Business and Finance representatives increased efforts to establish and renew contracts with state agencies including the Joint Bond Review Committee, the Commission on Higher Education and the Division of General Services. Business and Finance also participated in efforts to improve relations between the University and the City of Clemson. One effort resulted in ATM cards being accepted on campus in addition to the Tiger Stripe cards. The ATM cards are advertised jointly by the University and city merchants and allow students to use modern technology for purchases both on and off campus.

Business and Finance expanded international contacts to support academic and research initiatives in Dominica, Costa Rica, Indonesia and Europe. Providing adequate support for international programs requires Business and Finance to understand the accounting and financial environments for each project. This understanding involves knowledge of international banking laws and regulations, foreign currency and currency conversions, and language and cultural differences in each country.

Efforts to improve internal communications accelerated with emphasis on salary and compensation issues, budgets, formula funding and Business and Finance accomplishments. *Kudos*, a newsletter celebrating the achievements of Business and Finance personnel, also was published. The *Business and Finance Strategic Plan* and the *Annual Report* were published and personnel from Business and Finance contributed to the *President's Report*.

Revisions to the *Clemson University Fiscal Policies and Procedures Manual*, *Clemson University Budgets and Financial Planning Policies and Procedures Manual*, *Clemson University Personnel Policies and Procedures Manual* and the *Clemson University Sponsored Programs Policy and Procedure Manual* were distributed to the campus. The *Clemson University Facilities Planning and Management Policies and Procedures Manual* was completed, published and distributed.

Special meetings were held with academic department heads and individual faculty to encourage discussions on a broad range of budget, research and personnel issues.

Internal Control

Accountability is increasingly critical as organizations move to codify appropriate internal controls; this not only is a response to past problems, but also an attempt to provide a more consistent measuring tool. A hierarchical model which contains nine components has been presented by the Committee of Sponsoring Organizations (COSO) which includes the AICPA and the IIA. The components are:

- Integrity, Ethical Values and Competence,
- Control Environment,
- Objectives,
- Risk Assessment,
- Information Systems,
- Control Procedures,
- Communication,
- Managing Change, and
- Monitoring.

Ethics and competence are the base upon which the other components rest. Monitoring is given as the last and smallest component, for if all other components are in place, findings in the monitoring phase should be minimal. In applying this model to the Clemson University Business and Finance organization, it appears many of the criteria for the components have been addressed. Listed below are the components, criteria and a description of Business and Finance actions taken or proposed, to meet the criteria.

Component:	Integrity, Ethical Values and Competence
Criteria:	Integrity and ethical values are practiced at all levels of the organization and people are competent.
Actions:	Business and Finance has issued an ethics policy to promote ethical practices within the division. Written job descriptions and the formation of a training organization, administered through Personnel Management and Development, help ensure the competency of employees.

Component:	Control Environment
Criteria:	There is an atmosphere conducive to effective control and a control consciousness on the part of its people.
Actions:	Standing advisory and review committees and ad hoc task forces exist to provide an environment of control and review for Business and Finance policy and control issues and for addressing campus-wide business policy issues.

Component:	Objectives
Criteria:	Objectives are established for the entity as a whole and for significant activities. Related implementation strategies and plans are established.
Actions:	Business and Finance has created a strategic plan for the division, outlining broad strategic objectives and more specific tasks for accomplishing these objectives.

Component:	Risk Assessment
Criteria:	Risks related to the achievement of the objectives are identified and analyzed.
Actions:	The assigning of risks to the achievement of objectives should be formalized by preparing a related document to the Strategic Plan. This document would outline the risks and benefits of completing each objective.
Component:	Information Systems
Criteria:	Information requirements are identified and systems put into place to provide the needed information.
Actions:	<p>Business and Finance has a continuing program of study of the administrative information systems. The Business Systems Study in 1989 and the Deloitte & Touche Study in 1990 provided great insights into the needs for information in Business and Finance. One result of these assessments has been the purchase and implementation of the IMRS reporting software.</p> <p>This software relies on the existing information system to extract core data and bring it into an environment flexible enough to meet the myriad reporting requirements of Business and Finance units.</p> <p>Business and Finance is continuing with efforts to facilitate and coordinate a campus-wide administrative software systems implementation initiative.</p>
Component:	Control Procedures
Criteria:	Control procedures are in place to ensure adherence to policy and address risks related to achievement of objectives.
Actions:	Business and Finance is subject to numerous external audits and internal audits, the results of which are reported directly to the audit committee of the board of trustees. Additionally, in-house monitoring by Financial Services will supplement these reviews and provide guidance to other Business and Finance units on control matters.
Component:	Communication
Criteria:	Relevant messages and information is communicated throughout the entity — down, across and upward in the organization.
Actions:	Several Business and Finance units produce newsletters and/or other publications which communicate information about their areas to the division and campus. Additionally, Business and Finance has just completed the major undertaking of reducing policies and procedures to writing for five areas: Sponsored Programs, Personnel, Budgets and Financial Planning, Facilities Planning and Management, and Fiscal Policies and Procedures. This set of manuals should communicate appropriate information to all areas of the campus.
Component:	Managing Change
Criteria:	Changes affecting the entity's ability to achieve its objectives are identified timely and responded to.
Actions:	Seven standing review and advisory committees have been identifying needed changes and offering implementation solutions.

Component:	Monitoring
Criteria:	The functioning of internal controls is monitored and policies and procedures modified as needed.
Actions:	The Financial Services unit of Business and Finance assists with audit recommendation implementation and performs in-house studies and reviews of internal controls.

As can be seen from this information, the Business and Finance organization is a dynamic one. The actions already taken by Business and Finance have positioned the organization to respond to the challenge of having a well-controlled organization, both now and in the future. By focusing on these control premises, the organization has established an excellent basis for controlled processes which will allow it to respond appropriately to increasing growth and change in Clemson University's Second Century.

The Accounting and Business Standards Advisory Committee (ABSAC) is very active in promulgating policies to better control processes and addressing technical matters of accounting presentation to ensure accurate financial statements. Policies developed in the past year include:

- Use of University Equipment,
- University-wide Signatures,
- Discretionary Policy,
- Retail Memberships,
- Moving Expenses,
- Bank Account Signature Authority, and
- IRS Regulation Implementation and Training.

Also, definitions for prepaid expenses and restricted funds have been researched and formalized. Auxiliary classifications also have been researched and appropriate actions recommended to properly classify and distribute costs and revenues associated with each operation.

Financial Planning and Management

Financial Planning and Management (FP&M) was involved in several University-wide initiatives. First, FP&M began periodic meetings with representatives from the campus budget centers to discuss new policies and procedures being disseminated by the division in addition to addressing budget center problems. In addition, several directors began participating in a new task force charged with responding to the unique needs of some research projects.

Budget Office

Clemson University began FY '93-94 with a budget for current operations exceeding \$332 million, a 2 percent overall increase from the prior year. The University Educational and General (E&G) budget, however, decreased by more than 2 percent from the prior year. An allocation of the state surplus from FY '92-93 of \$2.1 million brought E&G up to roughly the prior year level. Perhaps the most disturbing trend regarding state appropriations is the continuing erosion of the University's permanent state appropriation base. Including the \$2.1 million surplus, more than \$6.5 million of the current state appropriation base comprises nonrecurring funds. Until this funding is restored by the state Legislature on a permanent basis, the University is at risk of losing this funding. In addition to stagnant state appropriations, internal revenues from student fees have been affected

by enrollment policies which reduced the student population. In looking toward FY '94-95, significant actions must be taken to enhance revenues and reduce the "fixed" cost base of the institution.

The block funding system, which served to allocate resources well in prior years of growth, is undergoing a complete review by a Strategic Planning subcommittee. The Budget Office is suggesting alternatives and modifications to the resource allocation model to accomplish the strategic goals of the University. Significant efforts have been made during the last two years to fine-tune the allocation model and adjust it to reflect changing financial constraints imposed upon the institution.

The Budget Office has been active in assisting Administrative Programming Services in the development of a client-server based reporting system which captures data off the legacy mainframe systems. This reporting system, while still driven off the existing administrative systems, allows greater flexibility in reporting and data analysis to end-users. These systems will be a critical interim step as the campus considers moving administrative systems to client-server technology.

In the last two years the Budget Office has been instrumental in developing the financial component of the computerized student enrollment model. Using this tool, we have been able to quantify the financial implications of decisions related to student fees. The model currently is being used as a primary management tool in reviewing optimal enrollment levels, in targeting the optimal residency mix of the student body and in quantifying the impact of fee increase decisions.

The financial exigencies of the campus environment during the last two years have necessitated the Budget Office taking a proactive role in the communication of financial issues to the campus community. To this end, we have established a committee to act as both a conduit to disseminate information back to the campus and to solicit feedback both on internal and external budget issues. The committee, made up of a cross section of the campus community, was established as a sounding board for internal budget methodologies. Also, the Budget Office holds regular training sessions with each budget center to educate key departmental personnel on all facets of budget activities.

Financial Planning

In the continuing environment of scarce resources, Clemson University continues to strengthen its financial foundations through the integration of long-range planning and the budget process. The publication of Clemson University's first comprehensive financial plan that provided one year of actual data and five years of projections, revealed the need to make some difficult decisions at the University. The recently begun restructuring and reorganization initiative has and will continue to rely heavily on financial planning projections and assumptions in its financial analysis. The financial planning function will continue to provide analysis and projections of where the University is heading, and to assess where progress has been made, and where there still is room for significant improvement. The continuing development of models to project revenue availability and expenditure requirements contribute to this function. The ongoing maintenance of the enrollment model in conjunction with Institutional Research, the recent development of an indirect cost model, and the projection of state appropriations to Clemson University are important activities that aid the University in its planning and budgeting processes. The integration of this analysis into the restructuring, budgeting and related decision-making processes is imperative in the current environment.

Financial Planning provides quarterly budget updates and endowment reports to the board of trustees. These regular reports along with other special reports, keep the board informed of numerous activities and developments, internal and external to the University, having significant financial implications. In addition, these

reports communicate significant political, policy and environmental developments with significant financial implications to Clemson University.

Assembling, maintaining, submitting and auditing data used by the Commission on Higher Education to generate the University's formula funding continues to be a routine and important function of this office. During FY '93-94, CHE implemented an electronic data collection system through which the University submitted comprehensive data to be used by CHE for numerous, and sometimes unknown, purposes. Due to CHE's attempts to greatly expand its control over higher education, this office, in conjunction with Institutional Research, worked closely to verify the accuracy, reliability and potential impacts of this system. In addition, Financial Planning worked to influence the development and use of this system by CHE. This office's role in monitoring CHE and other state activities that may have significant financial and related impacts on Clemson University is one of the more important functions. Attempts during the past several years to significantly alter the funding formula, CHE's role and authority and other related policies, have had serious consequences for Clemson University. Continually monitoring and assessing the impacts of these proposed and actual changes is essential in the current environment.

During FY '93-94, the endowment and investment activities were transferred to this office. Monitoring, managing and making appropriate recommendations related to this function is essential during this period of increasingly scarce public funds. In its role as investment manager and analyst, Financial Planning, in cooperation with the University's cash manager, initiated changes in investment policies to significantly increase the investment income earned by the Clemson University Research Foundation (CURF).

Sponsored Programs Accounting and Administration

The Office of Sponsored Programs Accounting and Administration has the responsibility of ensuring that all external projects are accounted for and administered in accordance with sponsor guidelines and University policy.

The primary focus this year has been to streamline operations and procedures to function effectively and reducing costs simultaneously. One method to achieve reduced costs has been through the utilization of electronic funds transfer capabilities. This procedure allows projects to be reimbursed in three days vs. 70 when paid by treasury checks. This enhancement reduces administrative costs and improves cash flows for the University. The goal is to convert every federal agency with more than \$120,000 in annual awards to electronic funds transfer. Other system enhancements have been made to improve project management through computerized information, giving departments immediate access to project data. This enables department managers to access information and initiate projects immediately.

The acceptance of federal funds commits the University to comply with complicated compliance terms and conditions. A four-day workshop was held in September 1993 to train the University compliance monitors of the federal requirements. From the evaluations, the workshop was very beneficial to the participants and the textbook is a valuable day-to-day reference.

In addition to compliance grants, administrative training has been held throughout the year to keep department administrators up-to-date with the latest requirements of federal programs. The Office of Management and Budget issued a revision to OMB Circular A-110 — Administrative Rules for Grants and Cooperative Agreements, November 29, 1993. Workshops are being developed to familiarize campus administrators with the new circular requirements.

The focus of the department this year has been systems enhancements, training and administrative effectiveness through continuous evaluation of processes and

services. Hopefully, these actions will prepare the department for the tremendous challenges of the 90s, as the nation refocuses its priorities in research, public service and education.

Business Affairs

The Office of Business Affairs consists of Cash Management, Non-Student Receivables, Accounts Payable, Card Access and the Bursar's Office. These areas include: student loan administration, accounts receivable, collections, petty cash and bank accounts, travel reimbursements and advances, American Express Travel and Departmental Corporate Card, returned checks, freight, cash management, Tiger Stripe, I.D. cards, student privileges, 1099 and some W-2 reporting, depositing of funds, registration payment activities and other business-related functions.

Cash Management — A University-wide cash management initiative began in late FY '92-93. The first step in this process was to centralize the movement and accounting of cash between the state treasurer and University bank accounts. In addition, a system was put into place to enable daily distribution of revenues to interest bearing accounts, resulting in a 30 percent increase in investment income over the first eight months of the system. Several auxiliary units have been segregated into separate financial entities on the accounting system, allowing for individually discrete financial statements. The necessary journal entries were prepared after researching Business Service transactions and the new accounting structure was explained to the departments. Cash balances for these units can now be tracked on the accounting system. A *Statement of Cash Flows* was initiated, a financial statement no other college or university is known to produce.

Non-student Receivables — University receivables has successfully implemented the American Express procurement card program. Approximately 70 cards have been issued, processing about \$10,000 of transactions per month. Collections for non-enrolled and non-student receivables exceeded \$103,000 and recovered \$40,000 through collection costs and fees, becoming the first year to generate full-budgeted revenues. Through the Utilities Task Force, the utilities billing process has become more efficient and cost effective. The costs of utilities are included in a department's initial budget, therefore eliminating the need for quarterly billings. New contracts were negotiated for third party collection agencies and conversion of the new agencies was put in place.

Accounts Payable — The design phase of the automated travel prepayment and reimbursement system was begun, clearing the way for University-wide access to an automated system. The design provides user friendly access and flexible management reporting. Tax-related initiatives resulted in a \$28,000 tax refund for research and development equipment purchases and an accommodations tax exemption for \$1,000. Campus-wide training continued and resulted in two additional departments being certified for voucher processing. Several software packages were researched as part of an ongoing effort to automate manual processes. Payments to individuals and utilities have been specialized and now are performed by one individual. The specialization process ensures consistent and efficient service, which continues to be a goal for the Accounts Payable Department. Relocation expense information was transferred to payroll which resulted in the elimination of an additional W-2 form. Vouchers for reoccurring vendors were combined and paid weekly to create efficiency which resulted in savings of time, postage and check processing. An informational newsletter, *Accounts Payable News*, was published to increase communications and improve service to the campus.

Card Access — Customer service, through the Tiger Stripe program, continued to be the main focus of the card access system. In particular, campus access expanded into many areas, resulting in direct benefits to the student body and other University community members. New access to Tiger Stripe includes:

- All campus washers and dryers.
- Purchase of football and basketball tickets.
- Donations for fund-raising events by student organizations.
- Copy machines in the University library.
- Payment of library fines and other charges.

In addition, Tiger Stripe incorporated new 'swipe' technology for vending machines, allowing for faster transaction processing. The Card Access Office was remodeled, resulting in more efficient operations and student services. Concentration was placed on working with the Student Government Association and the Clemson Chamber of Commerce to give students the capability to make off-campus purchases with a system similar to Tiger Stripe.

Bursar's Office — During the summer of 1992 an electronic approval system for credit card payments was implemented. The new system enables cashiers to instantly gain approval or denial of credit card payments, reducing the need for after-the-fact collection of denied credit card payments. The Bursar's Office provided technical support for other University departments implementing the electronic approval system. Processing of daily cash reports, returned checks, refunds and receipt corrections was automated through a PC-based system. A substantial increase in financial aid recipients was experienced due to changes in federal regulations from the Reauthorization Act. Bursar's Office banking hours of operation were restructured to provide more focused customer service. Fewer students need to attend a formal registration due to more flexible indebtedness guidelines. Elimination of costly forms and improved student service resulted from streamlining the graduate assistant payroll deduction process. Billing fees and collection costs for past due student accounts, including deferred financial aid, were assessed as an incentive for timely payment of debts. A conversion to an alternative billing agent for 3,100 student loans was started during the summer 1993. Improvements to the registration procedures once again were changed to combine the process of fee assessment and payment into one location, providing better service to the student. Utilization of other Business and Finance staff during registration, instead of hiring temporary or part-time employees, realized a cost savings. The responsibility of reconciling the student receivable system and the financial aid disbursements was transferred to the bursar's area in July 1992. A policy for assisting veterans with payment problems was implemented in fall 1993. Accepting credit card payments by facsimile was begun in the spring 1994 advance bill. A manual process for handwriting student refunds for emergency purposes was automated to provide needy students with faster service.

Comptroller's Office

Improving processes with a service orientation and departmental accessibility to management information continues to be the goal in the accounting areas. Efforts have been focused on improving or streamlining processes while strengthening processes essential for institutional integrity.

The Comptroller's Office has continued to document, evaluate and supplement departmental needs for management information. Although financial constraints and available programming resources limit major enhancements or the replacement of University financial software, projects have been completed which enhance depart-

mental reporting capabilities. New transaction types were added to facilitate shipping charges and the departmental credit card processes.

The PC-based reporting software has been expanded to provide summary management information to the vice presidential areas and the auxiliary business units. Utilizing the PC-based reporting software allowed the University year-end financial statement preparation process to be streamlined from two months to several days. In the planning stages is the replacement of the Clemson University Research Foundation accounting and human resources software.

The Comptroller's Office has been actively involved in the accounting and auditing standards debate. Comments have been offered on proposed changes by the Financial Accounting Standards Board and the Governmental Accounting Standards Board. The staff also has participated in group discussions and task forces on financial accounting and auditing issues through professional organizations. Networking with other higher education institutions on accounting and tax issues are being pursued through the use of electronic mail through NACUBONET.

The Comptroller's Office has taken a coordination role for Business and Finance in addressing tax issues for Clemson University and its related organizations. The staff has participated in the IRS proposed audit guidelines debate and offered comments through the National Association of College and University Business Officers. An internal review was performed to identify areas of concern, and University processes were modified to reduce potential tax exposures. Tax training workshops identifying process changes have been presented to departmental personnel. A savings of \$18,000 has resulted from the in-house preparation of the University unrelated business income tax and the Foundation's unitrust tax returns.

Focus has been placed on recommendations made in prior financial audits. Substantial improvements in reporting and coordination of construction and debt accounting have been made in University plant funds and fixed asset accounting areas. The University financial audit was completed in record time this year. The related organizations' financial and A-133 federal single audits were completed without any management letter comments from the auditors.

The University's annual financial report format was modified this year to comply with the Government Finance Officers Association criteria. This year's annual report, the *Clemson University Component Unit Financial Report*, was submitted to the Government Finance Officers Association and received the Annual Certificate of Achievement for Excellence in Reporting.

Auxiliary costing, allocation and classification issues were addressed, and formal policies were documented. Accounting Services has assumed additional responsibility for auxiliary financial analysis.

A substantial effort has been made in documenting and communicating the regulatory processes. The accounting areas served on a committee to formalize and document the University discretionary expenditure policy. Emphasis has been placed on communicating and improving understanding through direct training sessions and revised policy statements. University restricted funds cash issues were reviewed, resulting in a formal restricted funds policy.

The accounting area was represented at national conference CUMREC '93 with a presentation on financial reporting at Clemson University. Visits also were made to other land-grant institutions — Mississippi State University and Penn State University — to discuss and share financial and reporting issues.

Accounting Services and Accounting for Related Organizations have been directly involved in evaluating and streamlining processes necessary to support users departmental efforts. The investment income allocation and the endowment budget process for the Clemson University Foundation have been replaced with a PC-based application, resulting in cost savings and reduced efforts for data entry,

improved accuracy, and more timely and consolidated reporting for departmental and college users. New cash accounting reports have been developed, assisting the Cash Manager function. The reporting and management analysis has been enhanced for the sponsored program, the EARTH Trust Investment Accounting Project.

Efficiency has been accomplished through additional cross training and prioritizing essential processes.

Managerial Accounting

During the annual reporting period it was determined that existing campus software was sufficient for development and negotiation of indirect cost rates. Therefore, no cost was incurred in procuring an indirect cost software package.

The past year saw the University negotiate favorable indirect cost rates for three fiscal years (1993, 1994 and 1995) utilizing internal resources. Campus/department training sessions were held to educate participants on the indirect cost rate process and identification of unallowable costs for federal indirect cost purposes. The current Indirect Cost Policy was formalized by inclusion in the *Clemson University Fiscal Policies and Procedures Manual*.

Cost analysis studies performed at the direction of management included: calculation of yearly G&A charges to auxiliaries, PSA and self-supporting E&G activities; athletic grant-in-aid waiver/E&G analysis; allocation of card access costs to users of the system; and allocation of Business Services internal administration costs.

The billing rates document was expanded to include more departmental listings. This document is designed to be a comprehensive listing of rates being applied in transactions involving students, faculty, staff, departments and organizations external to the University. Efforts were expended to include Student Government in the review and approval process. The billing rates document was incorporated into the *Clemson University Fiscal Policies and Procedures Manual*, thereby eliminating the need to publish a separate document.

The director of managerial accounting served on numerous committees and task forces during the past period, addressing such issues as privatization, administrative career paths, research, patents, and general and administrative charges.

Administration and Quality Management

Administration and Quality Management, created to provide support services to other Business and Finance operations, includes the departments of Business Information Systems, Business Research and Assessment, Career Path Administration, Facilities Information Systems, and Information Support Services.

Administration and Quality Management worked with Clemson University employees in Facilities Maintenance and Operations (FM&O), Employee Training and Development, and Wage and Salary Administration to design a career path for FM&O. The career path concept, as designed by Clemson University employees and approved by the Division of Human Resource Management, clearly defines the skills, knowledge and abilities necessary for advancement to the next step. These requirements are obtained through a combination of on-the-job training and professional development courses. Once an employee has obtained the necessary skills, knowledge and abilities, advancement to the next step is automatic, provided the employee's performance in the current step is satisfactory. Task forces for Business Services and Business and Finance administration have begun designing the frameworks for additional career paths.

Business Information Systems

Business Information Systems (BIS) provides internal support for desktop and network computing systems. This support includes consulting, hardware maintenance, software development and training for more than 250 personal computer users. Even though the training center was unusable for several weeks due to renovations, BIS staff coordinated and conducted 40 computer training classes for 251 employees. BIS also works with Administrative Programming Services to plan and implement enhancements to University financial and human resource systems.

During the past year Business Information Systems worked with departments to offer on-line access via GOPHER to various state procurement contracts, minority vendor listings, job descriptions, job postings and others. The wide availability of this information will allow for a reduction in costs associated with the frequent printing and updating of this information. BIS now has initiated development of a new phase of this information system which could offer on-line access to publication quality copies of the *Clemson University Fact Book*, financial statements, budget documents and other University data.

Business Research and Assessment

Business Research and Assessment is responsible for coordinating the Business and Finance Continuous Improvement Program. The Continuous Improvement Program forms the core of Business and Finance's quality initiatives. Fourteen task forces have been formed to review major processes within Business and Finance and to recommend improvements. Major processes studied to date include work orders, purchasing and accounts payable, employment, travel and cash management. In addition, task forces have developed policies on work rules and ethics. Recommendations from the task forces are consolidated into one document, and updates on the implementation of the recommendations are published annually.

Clemson University's participation in the National Association of College and University Business Officers (NACUBO) Benchmarking Project is coordinated by Business Research and Assessment. The NACUBO project is intended as a tool to identify areas for improvement through a comparison of costs, outputs and service between participating institutions. NACUBO has established approximately 600 benchmarks for 40 functional areas with more than 130 participants.

In addition to the NACUBO Benchmarking Project, Business Research and Assessment has developed costs for several key processes including purchase orders, payroll checks, hiring employees, travel reimbursements and invoice processing. These costs are not used to evaluate employees, but to identify potential savings through the elimination or modification of individual steps in each process.

Business Research and Assessment prepared the *Business and Finance Annual Report* and an update on the Continuous Improvement Process. In addition to these reports, the department coordinated the Business and Finance section of the *President's Report* and reports on a variety of issues including regulatory relief and space requirements for the division.

Career Path Administration

With the implementation of the Facilities Maintenance and Operations (FM&O) Career Path, a team of existing employees was formed to provide day-to-day administration of the Career Path Program. The program requires both on-the-job and professional development training for employees to advance. Two members of the administration team are dedicated full time to providing training and assistance to Career Path Program participants and supervisors.

Career Path participants, with guidance from their supervisors, may select from a host of professional development classes offered through Employee Development

including: Time and Priority Management, Stress Reduction, Managerial Styles, Coping with Change, Dealing With Authority and many others.

Additionally, specific courses to meet the needs of FM&O were developed. Basic and Advanced Blueprint Reading were among the first classes offered and, for months, had waiting lists of participants. Classes added in the second quarter included: Transition from Worker to Supervisor, Effective Presentations, Effective Leadership, Making On-the-Job Training Work, FM&O Missions and Systems, and MPAC Software Overview.

Most recently, Introduction to Computers was added along with an Introduction to Keyboarding, Fire Code Evaluation of Building Safety, Introduction to Supervision and an Asbestos Awareness Program.

All but two of the newly developed courses were taught at no charge by University employees or graduate students. This enabled us to offer quality programs while remaining extremely cost effective.

By September 1993 Business Information Systems had designed a Career Path software program for registering employees for classes and tracking attendance. The program's availability on the Sikes Hall network enabled several users to register employees for classes and look up schedules. Refinements to the system continue almost weekly.

The first formal attendance reports were sent to supervisors and employees in early February, and in the future, will be provided monthly to supervisors and quarterly to employees.

A periodic *Training Update* is sent to participants and suggestions for future course offerings are solicited. A training advisory committee also is being formed.

During the first seven months of the program, more than 200 employees took classes despite a waiver of the Professional (Employee) Development Training requirement for the first year. Total employee contact hours during this initial period totaled 2,800 hours, and enrollment numbers continue to show a steady increase.

To introduce the program, information and training seminars were held for employees and supervisors. One-on-one assistance also was provided to supervisors and employees to assist with the implementation and monitoring of the Career Path program. A *Career Path Newsletter* was initiated to disseminate information to employees on new or changed policies, promotion updates and other Career Path program news.

The Career Path administration team also was actively involved in working with the Business Services and Administration Career Path task forces.

Facilities Information Systems

Facilities Information Systems (FIS) continued to enhance the Maintenance Planning and Control (MPAC) system utilized by Facilities Maintenance and Operations (FM&O) and Facilities Planning and Design (FP&D). With a change in reporting channels that positioned FIS under the administration of Administration and Quality Management, a focus on customer service to the two facilities areas was undertaken in conjunction with Business Information Systems (BIS).

A necessary upgrade to the existing hardware and user license allowed increased customer service and expansion of computing capabilities within the facilities areas, as well as other campus entities. The new equipment, housed in Sikes Hall, is administered by BIS in conjunction with personnel in FM&O administering the data base.

An accounts payable interface was written to accommodate the certification of the Facilities Business Office by Accounts Payable that allows direct purchase voucher payments to be processed electronically to the University check writing system. A key maintenance data base system was developed through MPAC to facilitate the locksmith shop. The capital projects tracking system with interfaces to

the University's AIS system was completed and implemented. This system will allow for more detailed and timely accounting of capital project budgeting by FM&O and FP&D with necessary links to the MPAC work order system. Enhancements to the MPAC employee data file were made to accommodate the FM&O Career Path. A new addition to the MPAC system is the FUSION (Facilities Utilities System Information Online) module also with interfaces to the University's AIS system. This system will eliminate a separation of utility billing procedures currently being carried out between FM&O and Accounts Receivable. FM&O will implement this new system before July 1, 1994.

Information Support Services

Information Support Services provides technical printing expertise and graphical design services for Business and Finance publications. This office also provides professional marketing services including the design, layout and materials for brochures, promotions and events.

Information Support Services completed the design and layout of the 1992-93 *Clemson University Component Unit Financial Report*, the *Business and Finance Productivity Report*, the *Business and Finance Annual Report* and the *Business and Finance Continuous Improvement Process Report*. *Kudos*, a newsletter celebrating the achievements of Business and Finance employees of the month, was designed, edited and published. Survey cards for Business and Finance were designed and sent to all departments on campus. The survey responses were tallied and distributed to each associate vice president for their response to problems or concerns. A copyright policy for Clemson University was drafted and presented to the president and vice presidents for approval. Participation in the fifth annual Benefits Fair by various Business and Finance departments was organized by Information Support Services, including the design and production of promotional materials and signage. The *Transportation Services Vehicle Manual* and the *Travel Policy Booklet* were designed and edited. Continuing updates for all Business and Finance policy manuals were produced and distributed. Information Support Services worked with Business Information Systems to begin including the policy manuals on GOPHER.

Logos and other promotional materials were designed for the openings of the renovated Harcombe Food Court and the new L.J. Fields restaurant. The University Bookstore's Christmas Open House and Clemson Authors Book Signing were organized. The book signing was attended by 30 authors, and another 31 authors were represented. Logo and promotional materials were designed for the "We're Glad You're Still Here" campaign to welcome returning students in fall 1993. The promotional materials for the freshman orientation packets were designed, edited and produced. Telecommunications Services worked with Information Support Services to design and produce the departmental listing for the *University Telephone Directory*. The logo and promotional materials were designed for the ATM Card Link, a cooperative venture between Clemson University and the City of Clemson.

Facilities Planning and Management

Facilities Maintenance and Operations

Facilities Maintenance and Operations (FM&O) provides building and grounds maintenance, custodial, utility and other operational support services to the University community. Completion of independent studies developed to assess the effectiveness of current policies, staffing and operational procedures led to the implementation of a progressive career path program for FM&O employees.

Another new program, Maintenance Workforce 2000, continues to evolve. A pilot project now in progress will evaluate the strengths of the campus zoning concept, a program assigning multi-skilled teams to designated areas of the campus. Each team will be responsible for the total maintenance of the buildings in "their" zone and will assume the challenges of "ownership."

In 1993 FM&O completed 297 work orders for repair and renovation of facilities. The turnaround time for the completion of work orders decreased to 8.3 months. The white paper recycling program currently services approximately 60 buildings.

Continuous projects successfully accomplished in 1993 include:

- Installed sidewalks and lighting campuswide to increase security.
- Continued a testing procedure to evaluate the lead and copper content in the drinking water system.
- Established a plan to contain and virtually eliminate CFC's on campus.
- Increased recycling efforts to comply with Federal Regulations Sub-Title D and the State Solid Waste Management Act.
- Performed air quality studies in Barre Hall, Lehotsky Hall and the Strom Thurmond Institute.
- Supported campus activities including Tigerama and graduation.

Continuing projects in 1994 include air quality surveys, utilities extensions, campus lighting and sidewalk improvements.

In addition to repairs and renovations, FM&O maintains 5.2 million square-feet of space; 750 acres of turf, trees and flowers; 20 miles of roads; 121 miles of sidewalks; 1.5 million square-feet of parking lots; disposes of 4,000 tons of waste per year; provides 113 million kilowatt-hours per year of electricity with a maximum demand of 17.3 megawatts; maintains the University's electrical substation; distributes electricity at 12,470 and 4,160 volts, 3-phase, through 16 major high-voltage circuits; purchases 507 million gallons of elevated storage capacity; produces 350 million pounds of steam per year using 17,000 tons of coal; provides 10,900 tons of refrigeration circulated through six miles of underground steel piping; maintains sanitary sewage collection and treatment of an average 1.3 million gallons of sewage per day; and maintains external lighting with approximately 800 fixtures and a power demand of 130,000 watts.

Facilities Planning and Design

Facilities Planning and Design directs the planning, project and construction management, and property management of the University's facilities, including campus master planning, real estate development, maintenance of the facilities data base, property records, and capital building and renewal projects.

Progress continued on campus building and renovation programs listed in the Permanent Improvement Program and representing more than \$350 million in projects. The following major projects either have been completed during the past five years, are under construction or are in design:

Toxicology Research Laboratory — The facility funded through a unique financial arrangement using the Clemson University Research Foundation, houses The Institute for Wildlife and Environmental Toxicology.....\$3,400,000

Ed Garrison Livestock Arena — The facility houses various types of livestock functions including sales, shows and rodeos and is financed with state general obligation bonds.....\$4,508,000

Academic Learning Center (Vickery Hall) — The 30,000 gsf facility provides study and other space for athletes and was financed through a contribution from IPTAY.....\$2,445,000

Rich Research Laboratory — A 40,000 gsf facility at the Clemson Research Park was constructed by a private developer for Environmental Systems Engineering.....\$5,500,000

Lightsey Bridge Apartments — The 600-bed student living facility currently is occupied by students.....\$9,700,000

Fernow Street Cafe — Food service facility with seats for 90 customers opened in August 1992.....\$660,000

Brackett Hall Renovation — The complete renovation of the old chemistry building houses both academic and administrative functions.....\$10,000,000

Harcombe Dining Hall — The renovation of the dining/service area began in January 1993 and was completed in January 1994.\$3,500,000

Performing Arts Center — The 87,000 gsf facility consists of offices for the Department of Performing Arts and has both large and small performance theaters.....\$12,300,000

Johnstone Hall Renovation — Involves demolition of two sections of the building (approximately 640 beds) and rebuilding on the current site to accommodate 590 beds.\$16,600,000

Center for Applied Technology — High technology incubator project funded through the Clemson University Research Foundation.....\$1,800,000

Flour Daniel Engineering Innovation Building — Academic facility of approximately 106,000 gsf will house Electrical and Computer Engineering and Mechanical Engineering.....\$17,715,000

Animal Research Compliance Facility — The 25,000 gsf facility will house a variety of research efforts both in agriculture and engineering, and will be funded with state and general obligation bonds. Construction began in February 1994.\$5,100,000

Jervey Center Addition — 22,000 gsf addition to and renovations of existing facility to provide offices, meeting rooms and space for equipment, training and laundry facilities.\$4,500,000

The following projects are in the planning and design stage, but not yet under construction:

Continuing Education/Conference Center — Conceived as a two-phase project, this facility will consist of a Continuing Education component and a golf course developed in Phase I. Phase II will include a hotel with various amenities..... Phase I — \$12,575,500

New Student Center — Facility for sorority chapters and student activity space financed by user fees and gifts. This facility will be combined with a 42,000 gsf facility for a bookstore, food services, post office boxes and copy center financed by an auxiliary bond sale.....\$17,500,000

Central Energy Facility — Proposed facility to retrofit and expand steam capacity through privatization.\$45,520,000

The Bishop Center — 20,000 gsf privately supported facility for ceramic materials research and testing.\$1,500,000.

Additionally, work has continued on the Campus Renewal and Replacement Plan. Since 1990, 50 deferred and major maintenance projects representing an investment in excess of \$15.3 million have been initiated. Many of these projects already have been completed.

In addition to individual projects, Facilities Planning and Design implemented reforms of the campus development process and both the Campus Master Plan and the Facilities Development Plan, integrating state bond, housing, maintenance and plant projects, were updated. The Department of Space Resources completed the data collection phase of the facilities data base update effort, and the Department of Property Management continued its strong working relationship with state agencies involved in the permanent improvement project process.

Planning and Design initiated improvements in the architectural selection process by revising the membership of the selection committee. Members of the committee now include:

- Campus master planner.
- End users of the project including the end-user vice president and one end user selected by the end-user vice president.
- Director of architectural and engineering services.
- Project manager.
- Members, board of trustees (appointed by the board chairman).
- Vice president for business and finance, chair.

The University also selects Indefinite Delivery Contract (IDC) consultants and occasionally advertises for major deferred maintenance projects. Members of the professional staff will continue to compose the selection committee for these consultants, but the vice president for business and finance retains the ability to review both the short list and the priority order. The recommendation by the selection committee for an IDC consultant will be sent to the vice president for business and finance, the end-user vice president, and the trustee's representative for approval.

Personnel Management and Development

Personnel Management and Development consists of four major areas: wage and salary administration, payroll and employee benefits, personnel services, and employee development. The associate vice president is the chief human resources officer and is responsible for the overall administration and leadership of the University's nonacademic human resource activities including classification/compensation activities, payroll and fringe benefits for faculty and staff, employee training and development, the employee assistance program, the employee suggestion program, retirement, unemployment compensation, employment practices and

employee relations programs, personnel management information systems, grievance coordination, and statistical and empirical research initiatives.

The associate vice president was elected to a director position for the Southern Region College and University Personnel Association and represents Business and Finance on the Professional Development Task Force of the Strategic Planning Implementation Committee and the Campus Building Air and Water Quality Committee. While 30 percent more grievances were submitted than in the previous fiscal year, only 20 percent went through the formal grievance procedure.

Wage and Salary Administration

The Office of Wage and Salary Administration has placed a greater emphasis on training. With the development of new personnel initiatives such as career paths and delegated authority to administer 85 percent of Clemson University's positions, employees must be well informed of Wage and Salary policies and procedures. Wage and Salary completed 34 salary surveys and conducted 21 workshops for 567 employees. Clemson University is the only higher education institution in the state providing training in this area and has supplied training material packets to other state agencies. Wage and Salary coordinated with the Provost's Office and the state Office of Human Resources (OHR) to compensate academic personnel for additional research work through research supplements instead of dual employments. The FM&O Career Path was successfully presented to OHR and defended by clarifying information and providing salary data. A data base was developed to track dual employment by vice presidential area. The number of reclassification requests submitted declined due to budget constraints, but 98.2 percent of the submissions were approved. The increased approval rate is due to the increased frequency rate of surveys/studies and desk audits being conducted and to increased training of employees in the proper presentation of information. State job specifications have been placed in DORIS for use by the University and other state agencies.

Payroll and Employee Benefits

The Payroll and Employee Benefits Office developed the Cellular Phone Program for University employees, and the program was extremely popular. W-2 forms were distributed with paychecks, resulting in significant savings in mailing costs. The fifth annual Benefits Fair, designed to communicate employee benefits, attracted approximately 1,600 employees and 65 exhibitors. Payroll procedures workshops were conducted to inform administrative employees of appropriate payroll procedures, and 28 meetings were held to inform employees of changes in state-sponsored programs. Significant time was devoted to studying the "IRS Audit Guidelines for Colleges and Universities" to develop procedures and processes to adapt to changes in tax law and the interpretation of tax laws. The VHS orientation tape for new employees was revised to reflect insurance program changes. The new tape was distributed to all off-campus offices. A new rate structure was implemented for charging the employer portion of the state health insurance program and to charge worker's compensation rates by risk category for each employee. The Family Medical Leave Act was implemented with changes in leave policies for employees on medical leave. The Payroll and Employee Benefits Office handled a large number of inquiries concerning the retirement incentive program and the retirement incentive opportunity early retirement programs for staff and faculty. The Benefits Office was chosen by the State Division of Insurance Services as one of the test sites for the on-line input for transactions related to state benefits programs.

	Fiscal Year 1990-91	Fiscal Year 1991-92	Fiscal Year 1992-93	Fiscal Year 1993-94
Exceptional Salary Increases	98	140	124	31
Reclassifications/Reallocations and Salary Adjustments	502	510	491	260
Dual Employment	692	1,336	812	492
Hire Above Minimum	69	111	57	31
Research Supplements	NA	NA	3	7
Awards (unclassified)	NA	NA	19	12

Personnel Services

Personnel Services serves the employees and administration of Clemson University through programs and activities including: employment referral services; employee relations; counseling and guidance; training and assistance programs; retirement administration and counseling; administration of some employee benefits such as leave, holidays and unemployment; policy development and administration; coordination and distribution of the *Clemson University Personnel Policies and Procedures Manual*; management and maintenance of the personnel data base and the Office of Human Resources data base.

Personnel Services completed training on the electronic leave system for administrative personnel in areas totaling more than 1,800 employees. Four on-line personnel actions were developed with Administrative Programming Services, and the job list was computerized. Reduction-in-force (RIF) options were developed for 11 departments, and more than half the employees potentially affected by the six RIF actions were placed in new jobs. Personnel Services successfully managed two early retirement programs by providing more than 4,400 counseling sessions. These programs resulted in the early retirements of 59 faculty and 136 staff. Personnel Services also handled 27 disability retirements, three in-service deaths, 718 employee counseling actions and a 162 percent increase in applicants for employment.

Personnel Services implemented numerous policies including: mandatory consideration policy; internal promotion/reassignment policy; flex-time/compressed work week policy; exempt compensatory time policy; tuition assistance policy; performance-based pay policy; retirement incentive plan; retirement incentive opportunity; relaxed dress code policy; employee recognition policy; the Family Medical Leave Act; the Americans with Disabilities Act; and the optional holiday policy.

Employee Development

Employee Development serves all University employees by providing seminars, workshops and conferences, administering the employee assistance program and employee recognition program (vice presidential awards, service pins and the employee suggestion program), research initiatives and revision and distribution of the *Clemson University Staff Handbook*.

Employee Development scheduled 98 seminars/workshops with 2,625 attendees and initiated the dial-a-workshop program. Efforts to expand the inter-agency partnership for training opportunities between Clemson University and Tri-County Technical College were initiated. Counseling and referral services were pro-

vided to 32 employees by the employee assistance program, a 23 percent increase. The employee suggestion program generated estimated savings of \$4,064 and awarded employees \$1,116 for the cost-saving suggestions. A revision of the new employee orientation was begun with the objective of developing a modular video set. Surveys were designed and analyzed to measure opinions of traffic control, flex-time and alternate work schedules, program evaluation, air quality and vice president evaluation. Employee recognition programs were provided for Agriculture and Natural Resources, Administration, Student Affairs and Business and Finance. Special departmental retreats were conducted for Records and Registration, Cooper Library, College of Engineering staff and the Organization of Academic Department Heads. Off-campus workshops for Extension departments were held throughout the state. A *Tiger Tracks* brochure was developed, detailing available benefits to employees.

Fiscal Affairs

Fiscal Affairs coordinated the issuance of more than \$30 million in three simultaneous bond refundings:

- Approximately \$22,810,000 to refund and defease the outstanding callable \$5,850,000 Student and Faculty Housing Revenue Bonds, Series L and the outstanding \$14,840,000 Student and Faculty Housing Revenue Bonds, Series M, satisfying the reserve requirement for Series M and paying certain costs and expenses incurred in connection with the issuance of the bonds.
- Approximately \$7,295,000 to advance refund and defease the outstanding \$6,480,000 Plant Improvement Bonds, Series 1991, satisfy the 1994 reserve requirement and pay certain costs incurred in connection with the issuance of the bonds.
- Approximately \$2,970,000 to advance refund and defease the outstanding \$2,610,000 Auxiliary Facilities Revenue Bonds, Series 1991, satisfy the reserve requirement and pay certain costs and expenses incurred in connection with the issuance of the bonds.
- A new money issue of approximately \$620,000 in Parking Facilities Revenue Bonds was issued to defray a portion of the cost of constructing new parking lots.

The following lease/purchase agreements were completed:

- \$125,000 to finance a portion of the cost of a new fire truck.
- \$35,000 to finance new computer equipment for Student Affairs.
- \$800,000 to finance the purchase of disk drives and controllers to store information on the mainframe.
- \$72,300 to finance a microfocus X-ray generator for the Physics Department.

Purchasing

The Purchasing Department issued 885 sealed bids, processed 5,381 purchase orders totaling \$37.5 million and received 67,426 shipments. A benchmark comparison of the automated purchasing system was made with a similar system at N.C. State. The comparison indicated the Clemson University system was equal to, and in some ways superior to, the N.C. State system.

The 1994-95 *Information Technology Plan* was submitted to State Information Technology Planning and approved. The approval allows Clemson University to receive and maintain a \$150,000 certification for information technology procurements. Procurement methods have changed to utilize requests for proposals vs. bids providing a more effective vendor evaluation and negotiation process. Changes in the S.C. Consolidated Procurement Code allow the University to use fax bidding to its fullest extent, allowing a quicker turnaround of purchase orders. Cost savings have been realized based on volume procurement through 31 information technology agency contracts.

Clemson University has established a 10 percent goal for purchasing goods and/or services from minority/women-owned businesses. Efforts to achieve this goal include: placing the *South Carolina Minority Business Directory* on GOPHER for campus-wide accessibility; participating in local trade shows; creating a Procurement Procedures Committee to review the M/WBE program, identify problem areas and to offer alternative solutions; an article in *Inside Clemson* solicited the assistance of departments; a memorandum signed by Dr. Lennon was distributed campuswide explaining the program and encouraging the participation and cooperation of all departments; the M/WBE plan for FY '94-95 was approved by the Governor's Office of Small and Minority Business Assistance; procurement officers met with representatives of minority and women-owned businesses to discuss the commodities and/or services provided; and Purchasing and FM&O continue to develop opportunities for minority/women-owned firms in architectural engineering and construction projects.

One procurement officer completed the National Institute of Government Purchasing's public purchasing courses and was certified as a professional public buyer. Four procurement code training seminars were presented to University employees. As a result of the Accountability and Reform Act of 1993, many changes beneficial to the University were implemented in the procurement process. Clemson University derived revenues of \$52,500 from the sale of surplus property.

Risk Management

Approximately 340 claims for worker's compensation, automobile liability, tort liability, fire insurance, data processing, comprehensive and collision, and inland marine insurance were processed, and more than 250 contracts were reviewed. Defensive driving classes were taught, and approximately 425 certificates of completion were presented. Worker's compensation information was provided at the new employee orientation. Risk Management worked with the state accident fund to close worker's compensation cases quickly to reduce insurance reserves and keep premiums at a minimum. Workshops for employees in departments with a high number of accidents were coordinated with the state accident fund Safety and Education Department. A courtesy walk-through OSHA inspection was provided on campus. Cases qualifying for second injury fund reimbursement were pursued.

Environmental Health and Safety

Environmental Health and Safety coordinated the removal of approximately 65,000 pounds of hazardous waste at a cost of \$120,000. The radiation safety unit has managed the University's rad safety program with an emphasis on waste volume reduction and minimization. In one instance, special processing techniques were used to reduce the price of disposal of two 55-gallon loads of mixed waste (hazardous and radioactive) from a contract price of more than \$15,000 to about \$4,000. The construction of the new rad safety facility was expedited with more than \$10,000 of necessary equipment procured through the USDA at no cost to the University. Assistance was provided to researchers studying the use of radioactive

materials including the writing of grant proposals and hands-on preparation of special research projects.

Radiation detection instrument repair and calibration services were performed for research investigators at no charge to the departments. Decontamination services were provided in response to several spills of radioactive and hazardous materials. Environmental Health and Safety provided radiation protection support in the installation of a new human diagnostic X-ray unit in the Redfern Health Center.

Regulatory support continued to be provided to the Institutional Biosafety Committee and its subcommittees concerning the approval and execution of biohazard protocols. Environmental Health and Safety currently is developing procedures for the control of biohazards, procedures for the disposal of biohazardous waste and a biohazards manual. The department assumed responsibility for the collection and off-site shipment of biohazardous waste.

Federal law requires a copy of the *Material Safety Data Sheet* (MSDS) for each hazardous substance used by each department be readily available to each user of the substance. Environmental Health and Safety purchased software to generate MSDS's on demand to satisfy this requirement.

A training seminar entitled "Biosafety in the Research Laboratory: Recommendations and Techniques," was conducted by Richard J. Green, M.S., training coordinator, and Henry Mathews, Ph.D., Safety and Occupational Health Manager, from the biosafety branch of the Centers for Disease Control. More than 150 research investigators and lab personnel attended the training which covered the safe handling of infectious materials, hazardous chemicals, radionuclides, and blood and body fluids encountered in the unique work environment of the research laboratory. This presentation focused on the implementation of laboratory safety practices and procedures under OSHA's "Bloodborne Pathogens Standard" and "Lab Standard," CDC/NIH guideline, "Biosafety in Microbiological and Biomedical Laboratories," and the NIH "Recombinant DNA Guidelines." The seminar helped the University meet the regulatory requirements to provide such training.

Clemson hosted a 40-hour hazardous materials training course accredited by the Environmental Protection Agency. By providing space for the seminar, the University received 14 of the 28 available slots at no cost. The remaining training slots were offered to persons outside the University at a cost of \$1,000 per slot. The normal travel expense and registration fees for off-campus training also were saved.

Business Services

Business Services no longer can assume that yesterday's successful practices will work in today's environment or in the future. To survive and be successful, Business Services' efforts must feature bold and innovative approaches unleashing the power of our people to create performance teams delivering outstanding service to the campus community. Success will be measured by the continual improvement of everything everyday for everyone.

The Business Services quality improvement program is designed around the following communications principles:

Quality Improvement Process

No Secrets Everyone in Business Services at all levels shares information openly.

No Surprises No one can claim to be in the dark about problems or opportunities.

<i>No Politics</i>	In Business Services, people get together, look at the same information and make tough decisions.
<i>No Distractions</i>	Management and systems operate in the background; they make noise only when things go wrong. People are free to get their work done.
<i>No Confusion</i>	Business Services knows what they need to do to succeed.
<i>No Waste</i>	Business Services is lean and mean.
<i>No Illusions</i>	We have no illusions about how tough things can be. That's why we constantly are modifying, improving and starting over.

In addition to these communications principles, Business Services emphasizes management by values as the backbone of its quality improvement process. Management by values is based on the following:

V alues based
A lignment of Customers, Employees, University
L eadership
U s. The teamwork factor
E ngineering Service Delivery
S tewardship

Management by values is a new paradigm based on the conviction that because our organizations comprise people sharing a common purpose, success is most likely to occur when the needs of our customers, employees and the University are consciously targeted. Therefore, Business Services' goal is to maximize perceived value to all stakeholders.

Agricultural Product Sales Center products were sold at Botanical Garden special events including the Daffodil Festival and the Easter Egg Hunt. Ice cream cups were made and sold at the T. Ed Garrison Livestock Arena. Development began on bottling Clemson Blue Cheese Salad Dressing to be marketed for sale in the near future. The East Campus Store offered stamps, limited video rentals, and copying services. Blue cheese and ice cream were sold at football and basketball games.

Dining Services addressed freshmen and parents during summer orientation, faculty and staff at the monthly new staff orientations, presented a program at NACUFS National Conference, addressed housing resident assistants at R.A. orientation and significantly increased exposure in national publications. Clemson Dining Services appeared in articles in *Foodservice Director Magazine* (2), *NACUFS Newswave* (2), *Nation's Restaurant News*, *College Services Administration*, *SACAS Newsletter*, *On Campus Hospitality* (2) and the *Vegetarian Journal*.

A Business Services Marketing Committee was established to coordinate marketing and merchandising activities for the division and to establish a marketing plan for Business Services. Dining Services participated on the Housing Marketing Committee and worked with Conference Services on their marketing plan. A comprehensive marketing plan was developed for Dining Services. Merchandising audits were developed and implemented to improve presentation and attention to detail. The audits are performed monthly and managers must respond to them with a timed action plan. Dining Services and the Athletic Department sponsored the

IPTAY student advisory board calendar. The calendar includes all Campus Dining Services specials, promotions and coupons for Dining Services' operations.

The nutrition education program grew substantially through the introduction of new features including: monthly menu table tents featuring nutrition tips; nutrition bulletin boards in meal plan cafeterias; new menu cards with nutrition information; more nutrition information posted in all dining facilities; the "Happy Happenings" column was added to *Food For Thought* with health tips and information about health/nutrition/fitness activities; the food service administrator served as a preceptor for the Health Science internship program; a food handlers workshop was developed by the Nutrition Committee and offered to student groups serving food on campus; presentations to a health science class on nutrition and campus dining services once each semester; development of a foodborne illness management plan; the World Vegetarian Day Vegetarian Food Fair which attracted more than 400 people; second annual Nutrition/Health Fair which attracted more than 1,500 people; served as a member of the NACUFS Region III Nutrition Committee; and presentation of a program at SCORE '94 (a statewide housing conference held at Clemson University).

Clemson Dining Services concentrated on making the meal plans as customer driven and flexible as possible. By reducing the number of medical releases, tightening internal procedures and providing follow-up for students who by-passed the system, revenues were increased from \$15,000 to \$20,000. A clearer process was provided for students to resolve meal plan problems. A utility management program was initiated with energy audits for each facility. Work orders were established to repair faulty equipment, and meetings were held with ARA managers to share audit findings and discuss solutions. The program realized a 17 percent utility cost savings during the first seven months of operation. One-year and five-year plans for preventive maintenance were developed for equipment maintenance, equipment replacement and facility maintenance.

The number of vending machines on campus increased by 24 percent while cooperation between the University, Coca-Cola and Cromer Vending decreased the number of service calls by 26 percent. The inefficient insertion card readers on the vending machines were replaced with new swipe card readers. Two new meal plans were offered in response to student requests. The Any 15 Plan allows students to eat any 15 of the 21 meals served weekly while the Commuter Five offers lunch only, Monday through Friday. The Clemson Dining Services' Employee Recognition Program was initiated to honor outstanding employees and an employee suggestion program was created to allow dining service employees to communicate directly with the food service administrator.

Logos were designed for each location to assist in marketing efforts and help build an identity for each facility. Location managers meet monthly with a group of customers to discuss concerns, suggestions and criticisms. Monthly theme dinners and weekly monotony breakers combined old favorites like the Christmas buffet and the souper soup bar with new culinary adventures like stir crazy (stir fry extravaganza) and dessert buffet a la mode.

On August 30, 1993, a group of freshmen cut the ribbon at the grand opening of the Harcombe Food Court. University President Max Lennon, former food service director Luther Fields and several vice presidents were among the students, faculty and administrators treated to a presentation of colors by the Clemson University ROTC color guard. This event marked the beginning of a week-long celebration featuring prizes and fun. The prizes included free T-shirts, cups, compact disc players, a bicycle, a telephone, a hair cut, a meal plan and \$100 on Tiger Stripe. The new Harcombe Food Court allows students to choose from six "clusters" of offerings including a deli/grill line; a pizza station; a pasta line; changing scenes featuring Oriental, Italian, Mexican, vegetarian entrees and breakfast all

day; a potato/taco bar salad bar; and a traditional hot line. Beverages, chilled salad bars, desserts and 21 breakfast cereals always are available. The new facility has greatly increased student participation during last year.

The Harcombe Food Court was phase I of a two-phase, \$3.5 million renovation project. January 10, 1994, marked the end of phase II with the opening of an upscale, full-service restaurant, L.J. Fields. L.J. Fields is open both for lunch and dinner and offers three private meeting rooms for parties of eight or more. L.J. Fields is named for former Clemson University Food Service Director Luther J. Fields. Mr. Fields and President Max Lennon attended an open house on January 21, 1994, to celebrate the opening of the new facility.

In addition to opening the two new facilities, Clemson Dining Services made many changes and additions in existing facilities. New features in Schilleter Dining Hall included: applying logos to the entrance doors of the main dining room and the athletic dining room; new signs were designed and mounted to identify services (i.e., hot line, salads, deli, changing scenes); a music video jukebox was installed and monitors were positioned throughout the dining room; the changing scenes program was expanded at dinner; new Coca-Cola dispensers were installed; the dining room was painted; napkin dispensers were placed on all tables; fresh fruit was offered all day; and all milk and tea dispensers were laminated.

The changes in the Clemson House dining room included: bottled water was added to the merchandiser; breakfast steak, steak kabobs and chicken breast were added to the grill menu; French fries were added to the dinner grill menu; cookies and pie were added as a dessert option for meal plan students; a frozen yogurt machine was added; a switch was made to Healthy Choice deli meats; Avanti gourmet coffees were introduced; and a weekly "treat yourself right" was established.

The canteen cosponsored the Freshmen Kickoff with the Athletic Department and Bytes and Bytes with the Micro Center. A pizza eating contest was held on Organization Day. A new delivery menu was developed and printed for the new lunch delivery service. The following new products were introduced: barbecue sandwich; Philly cheesesteak; hot beef and cheddar; Crunch Yogurt; Healthy Choice deli meats; Harmony Snacks; Avanti gourmet coffees; Nestea; American tea; relish tray; Greek salad; chef's salad; and Dunkin' Donuts.

The Fernow Street Cafe introduced new features including: "Coffee Club Awards" — after any six purchases you get a small coffee and donut free; "Sandwich Club Cards" — buy any 10 deli sandwiches and get one free; "Night Owl Specials" — from 6 to 10 p.m. to increase evening sales; sausage gravy; hash browns; barbecue sandwich; Philly cheesesteak; hot beef and cheddar; French dip; V-8; apple juice; Tropicana Twisters; Sunny Delight; assorted yogurt; Nestea; assorted breakfast cereals; assorted bagels; a second drink merchandiser was added to speed service and expand selection; and Dunkin' Donuts.

The University Postal Service implemented a bulk mail pickup/delivery service. Departments may contact the University Post Office for a special pickup for delivery of bulk mail to the local post office. A postal shipping and supply center with mailing materials was installed at the counter area in the Student Post Office to provide customers a "one-stop" service for purchasing mailing materials. The University Postal Service received an outstanding achievement award and \$300 from NACUBO. Access to the University's mainframe computer will allow students more flexibility in providing mail forwarding addresses.

Transportation Services initiated a new fuel purchasing procedure which resulted in approximately \$30,000 in savings. The change also resulted in less "down-time" for the fuel island since fuel is delivered fewer times in larger quantities. There also has been a considerable reduction in the number of invoices and checks submitted for processing. Contacts with local vendors have been effective in

consolidating purchases and reducing costs. Local parts vendors were chosen to supply various parts based on quality, price and the ability to supply a full line of parts. The parts contracts will reduce telephone hunting for the best price, the number of invoices and the number of checks written to vendors.

Motor pool hours were expanded on a trial basis. The garage and dispatch hours were extended until 6:30 p.m., Monday through Thursday. A *Vehicle Operations Manual* was written and placed in all daily dispatch vehicles. The manual explains the policies and procedures of leasing, operating, vehicle return, driver responsibilities, credit card use, emergency repair and accident and insurance information. Various phone numbers for use in emergencies also are listed.

Motor pool technicians attended Greenville Technical College classes: "Fundamentals of Closed Loop Fuel Injection," "Fundamentals of Air Conditioning," "All Wheel/4 Wheel Drive Systems," and "Specialized Electronics Training." The vehicle maintenance facilities at the Sandhill, Pee Dee and Coastal Research and Education Centers, in addition to the Forestry facility, were inspected for compliance with the S.C. Division of Motor Vehicle Management maintenance guidelines. All facilities passed this inspection with Sandhill receiving an outstanding rating.

Transportation Services acquired two alternative fuel vehicles with the purchase of two dual fuel Dodge Dynastys. These vehicles operate on either gasoline or compressed natural gas (CNG). A CNG fueling station, provided through the state Motor Vehicle Division, is expected to be installed in the next few months. An electric-powered vehicle is being considered for use by the University Police Department. Six 12-passenger vans, two police cars, two small pickup trucks and two shuttle buses were ordered during the year. The new shuttle buses will be a different design than the present shuttles. The new design, a true small bus, will reduce maintenance life cycle costs, have a longer useful life and a larger passenger capacity. All of these vehicles will be equipped with the 134A refrigerant instead of freon.

Many updates to the computerized billing, vehicle maintenance and dispatch system were installed this year. The new updates allow instant access to the total number of vehicle dispatches, vehicle preventive maintenance checklist, vehicle rental revenue, and total maintenance and operations cost per vehicle for a given period of time.

The state Motor Vehicle Management Office introduced a recap tire program for state agencies to be effective on July 1, 1994. Clemson University already has implemented this cost-saving program. The fleet services manager served as chair of the state Friction Fighting Committee and was a member of the state Vehicle Specifications Committee and the state Parts Contract Committee.

A new contract was negotiated with Southern Bell to provide the campus with telephone services at a reduced rate totaling \$700,000 over the next five years. A new contract for publishing the *University Telephone Directory* increased advertising revenues by 233 percent. Cable TV service was installed in all residence hall lounges. Speed dialing was provided as a free new feature on student telephone lines, and students were allowed to pay phone bills with a charge card or Tiger Stripe by telephone. Coin receptors were installed on the card access control boxes for all of the laundromats. Three new buildings — the Brooks Performing Arts Center, Holmes Hall and McCabe Hall — were wired for high-speed digital data services, and video wiring was installed in Holmes and McCabe. Most or all of the offices in the following buildings were rewired to accommodate both voice and high-speed data service at one outlet: Alumni Office, University Bookstore, Development Office, Fike Recreation Center, Long Hall, Mell Hall, Police Department, Sikes Hall, and the Trustee House.

Printing Services now offers more recycled products including envelopes, coated stock paper and coverstock paper available in both white and color with soybean ink. The recycling system for waste paper and printing supply byproducts was improved.

The ability to accept hard copy text and produce a 35mm color slide now is available. The system also will do color slide transparencies with a finished size of 2 1/2 x 3 1/2 for overhead projectors. Top quality imagesetting using Aldus Free-hand 4.0 also is available. The Xerox 5090 copy machine allows Printing Services to offer: heat binding; copying onto 8 1/2 x 11, 8 1/2 x 14 and 11 x 17 paper; stapling; and reduction and enlargement. The offset printing area updated the duotone process to allow two colors of ink, and the use of Group I software has increased Printing Services presort capability. Color transparencies also are available in the Union Copy Center, and Copier Management offers machines which collate, duplex and automatic document feed with reduction and enlargement capability.

The *University Bookstore* offers a full-service textbook department, a trade book section, a special order service, gifts, school supplies, art and engineering supplies, a full-line of Clemson University insignia items, and assorted dorm supplies and personal items. The "Create a Card" machine from American Greetings allows customers to design their own card.

The merger of *Central Stores* with the University Bookstore enabled the relocation of the shipping, receiving and warehousing functions to the roomier Service and Support Facility. A Bookstore Accounting Department also was relocated to Central Stores freeing up more space in the Bookstore for sales merchandise.

Remote book buyback locations were linked electronically to the bookstore computer system, allowing direct access to the wholesale price of books and direct data entry into the inventory component. Tiger Stripe payments have been integrated into the bookstore accounting system as an option on the cash registers. Customer service is faster since only one machine is used for charges, and Tiger Stripe reconciliation's are quicker and more accurate.

The Bookstore Employee Strategic Committee was formed to promote better communications among all employees. The committee will be a permanent part of the bookstore and is expected to generate creative revenue producing and cost-reduction ideas and will have the authority to act on suggestions. All employees will have an opportunity to express concerns and ideas to the group. Teamwork also is emphasized through cross training with the Central Stores operation. Many employees are able to work effectively in either location. Staff in the Bookstore Accounting Department were cross trained to handle any accounting function, and job descriptions were modified to remove any barriers to a team approach. The result was a streamlining of the accounts payable process and the ability to rely fully on the monthly aging report to book payables into AIS.

INSTITUTIONAL ADVANCEMENT

1993-94 Overview

The year ending June 30, 1994, was a year of transition for the Division of Institutional Advancement. Private gifts and assets continued to grow, although alumni participation declined. Budget cuts caused a thorough analysis of institutional priorities and continuing reorganization of functions to seek greater efficiency

and eliminate duplication. Volunteer and staff teamwork continue to pave the way for progress in Clemson's external operations.

- \$20.6 million in gifts were received during FY '93-94 — a 9 percent increase when compared with the previous year. The average dollar amount for each gift increased from \$989 in FY '93 to \$1,184 in FY '94. The total number of gifts dropped from 19,183 to 17,451. Total giving from individuals reached \$8.9 million. Corporations gave \$8.3 million plus \$768,000 in matching gifts, while foundations and other organizations gave \$3.5 million. Faculty and staff gifts totaled \$207,000. Unrestricted giving totaled \$645,000.
- Alumni participation dropped to 14 percent, down from 17 percent a year ago and 20 percent two years ago. While the average dollar amount per gift was up, the declining participation among alumni in the Clemson Fund is a trend which must be turned. Nearly 300 fewer individuals participated in the major gift club program this year than in the previous year.
- The cost to raise a dollar for FY '93-94 was 10.55 cents. This figure includes all costs for the Development Office and fund-raising costs in the colleges and administrative units. The national average among all colleges and universities is approximately 16 cents.
- The University's combined endowment rose 5 percent, from \$79.8 million to an estimated \$84 million. The managed endowment pool of the Clemson University Foundation experienced an investment performance return of 2.2 percent. This represents 3.6 percent return on equities, 1.3 percent return on fixed income investments and 3.1 percent return on cash.
- The deferred gift inventory rose to \$41 million, up from \$38 million, in FY '92-93. The inventory contains \$23 million in bequests and \$18 million in trusts, insurance and other deferred mechanisms.
- Following a thorough market analysis by the foundation's executive committee, the Foundation board of directors reduced the Foundation's endowment income spending policy from 5.4 percent to 4.75 percent, to be phased in during the next two years.
- Dr. Pierre Allaire reported for duty on October 1 as the new associate vice president for development. His appointment brings new leadership and experience to the development program.
- The 1994 legislative session brought progress to higher education and to Clemson University with a 4.3 percent average pay increase for state employees and a \$47.3 million increase in E&G formula funding (\$10 million in recurring and \$37.3 million nonrecurring).
- An effort to restructure the governance of higher education in South Carolina consumed much of the 1994 legislative session. The Business Advisory Council and the Council of College and University Presidents led a legislative initiative to displace the current Commission on Higher Education with a more suitable structure designed to increase advocacy and efficiency and decrease bureaucracy and political posturing. Related bills died in subcommittee but will be resurrected in the 1995 session.
- A statewide network of Clemson legislative advocates brought increased support to the University's legislative agenda. Considerable progress was made in the use of volunteers to further our legislative priorities.
- A University communications team met regularly throughout most of the fiscal year. Senior personnel in News Services, Alumni Relations and Publications and Graphics created proactive approaches to deal with emerging issues. The group responded to several challenges relating to internal and external communication.

- The Public Affairs units were pressed to effectively communicate major initiatives relating to several campus-wide reorganization task forces as well as a presidential transition and multiple changes in key coaching positions.
- A significant reorganization in Public Affairs was consummated in FY '93-94. A total of more than \$200,000 in savings for a two-year period was achieved through the elimination of an associate vice presidency, all assistant vice presidents and significant portions of the operating budget. The quality of the University's external communication media remained high.
- Robin DeLoach, who was promoted to director of News Services, brought insightful leadership to the University's news and media relations program.
- The *Clemson World* magazine was redesigned. The new magazine was introduced in summer 1993 with outstanding reviews and considerable reader interest. Under a new policy, the magazine is mailed to all alumni, whereas it was previously sent only to donors.
- A community newsletter was initiated as part of the University's Strategic Plan for Community Relations. The newsletter successfully communicates key campus/community information to all area residents.
- An Alumni Relations Strategic Plan was completed and approved by the Alumni National Council.
- Ground was broken for a new University Visitors Center; the center is being built by the class of 1944.
- The Visitors Center celebrated its 10th anniversary in 1994. The center annually receives some 26,000 visitors and conducts more than 700 tours for more than 10,000 people, nearly 7,000 of whom are prospective students. In addition, the Visitors Center receives some 300 school and community groups which bring an additional 11,000 people to the center each year.
- Successful transition continued with leadership for Clemson's eight historic properties. The Calhoun House combined operations with the Visitors Center. The Hanover House was physically moved to the Botanical Gardens to make way for a proposed student center in the East campus area.
- The Clemson credit card surpassed the \$1 million plateau in its 60th year of service. Nearly 15,000 alumni now use a Clemson Mastercard or Visa card.
- Year-end budget cuts continue to take their toll on the division. For the fourth year in a row multiple cuts in the state-appropriated budget caused significant declines in operating budgets and a reduction in services and service capability. For the second year in a row a reduction in force meant eliminating key positions within the division. Four positions were eliminated, including positions relating to special events, proposal writing, computer programming and governmental affairs.
- The total number of minority employees in the division increased by 25 percent with key appointments in Alumni Relations and Development.

Public Affairs

The Public Affairs organization completed its first year of existence on June 30, 1994. The year began with the implementation of a reorganization that brought together under one umbrella most of the communications and public relations units formerly under University Relations and Public Affairs. As a result of the reorganization:

- An associate vice president's position was eliminated.
- All assistant vice president titles were eliminated.
- The Department of Constituent Communications was eliminated (with internal news operations moving to News Services and *Clemson World* to Publications and Graphics).
- Administrative budgets were reduced by more than \$60,000, including fringes.

A subsequent budget reduction unrelated to the reorganization eliminated art services provided by Electronic and Photographic Services through a reduction-in-force. One full-time and two part-time positions in the department were eliminated, for a net savings of approximately \$55,000, including fringes.

The latest round of budget cuts will further reduce E&G funding for Public Affairs by approximately \$135,000. The mandated cut will be achieved through attrition, reducing computer costs, increasing generated revenue, consolidating publications and pursuing a merger with agricultural communications operations to reduce duplication. Because of these efforts to reorganize, reduce expenses without cutting back on communication, consolidate and redesign publications rather than eliminate them, and generate more funding from external sources, the budget and personnel reductions have not impacted most services offered to University clients.

In fact, as the following reports will indicate, productivity and quality have remained high. Given all the communications challenges and opportunities presented during FY '93-94, high productivity and morale have been more critical than ever. That promises to hold true for FY '94-95 as well.

Highlights and major accomplishments of the year included:

- Redesign of *Clemson World*.
- Expansion of the Extension video network.
- Introduction of a new community newsletter (a companion piece to the *President's Letter*) without an increase in the *President's Letter* budget.
- Introduction and expansion of electronic communications systems (including a dial-in computer bulletin board of news releases and information for the media and an on-line news service for campus constituents).
- Public relations counsel and strategic communications planning for issues ranging from the hiring of a football coach to the resignation of a president.

Department of News Services

For the second consecutive year, the Department of News Services experienced a period of transition during an extremely active year for the University in terms of news. Several personnel, organizational and operational changes occurred during the year as a result of reorganization and downsizing in the Division of Institutional Advancement and within the department.

On July 1, the director of News Services was promoted to associate vice president for Public Affairs, leaving the news director position vacant at the beginning of a new fiscal year for five weeks. The position was filled with an internal candidate, Public Information Director Robin DeLoach, on Aug. 9. Her position was not refilled.

In addition, the internal communications functions of the former Department of Constituent Communications were merged into the Department of News Services, with the physical relocation of two employees to the Trustee House.

In January, the department switched to a new computer system (from the University's Vax system to an independent Macintosh system), resulting in the savings of thousands of dollars, beginning an intensive (and sometimes traumatic) retraining period as the entire staff worked to learn a totally different method of

computer operation and communication. As a result of good budget management and financial calculations, the three-year contract for payment was "paid in full" by year's end.

Highlights and Accomplishments

- Management of extensive internal and external news coverage pertaining to:
 - the resignation of Clemson University President Max Lennon and naming of an acting president;
 - the establishment and continuing work of six task forces as they strategically plan for the restructuring of the University's organizational, budget, rewards and professional development systems;
 - the development and implementation of a two-year budget reduction program Universitywide;
 - the resignations of three deans;
 - the resignations of the head football and head basketball coach and employment of two new coaches (cooperative effort between News Services and Sports Information); and
 - several controversial administrative policies.
- Successful promotion of some positive honors for and accomplishments of the University:
 - professor of the year,
 - inaugural season of the new Carolinas NFL team to be played at Clemson,
 - ground breaking for a new continuing education and conference center and golf course,
 - dedication of a new performing arts center, and
 - opening of two new residence halls.
- The cross-generational John de la Howe project in McCormick County; a record-breaking year in fund raising; results of an international study on the effects of lead in the environment — the Pink Floyd rock concert.
- For the first time, the University's graduation list and honor rolls (dean's and president's lists) were available to all state media electronically via our departmental computer bulletin board library of information. Providing tremendous savings in time, printing and postage, this is beneficial to our department as well as the media who no longer have to retype these lists, reducing potential for error.
- The department increased its focus on internal communication with faculty, staff and students via *Inside Clemson* newsletter, *Inside FAX* notices and *The Tiger*.
- One staff member co-authored a book on education practices, published in the second quarter, with a faculty member in the College of Education.
- A staff member wrote the first issue of a new *Community Connections* newsletter, a biannual publication which moved under the associate vice president for Public Affairs in the second half of the year.
- A staff member wrote copy for the annual *President's Report*.
- A staff member wrote copy for a research booklet for the USDA, a grant-funded project.
- Establishment of new graduate assistantships and academic internships to assist in coverage of academic and administrative areas and provided valuable experience for students.

Activity Overview

The Department of News Services employs a variety of methods to evaluate its effectiveness. Analysis of media contacts by the department's six professional staff members and clips resulting from those contacts are an integral part of the department's activities.

Representatives of the news media are contacted by News Services in person, by telephone and by written information in the form of news releases, a daily electronically delivered tip sheet called the Clemson Daybook and a weekly tip sheet called the Press Memo. Written information is disseminated either by paper mail, fax or electronic mail, depending upon the media outlet's preference.

The Clemson University Bulletin Board, CUBB, continues to gain favor with the media as a one-stop-shopping electronic approach to receiving information from News Services by personal computer. It has been in service less than two years. In addition to making all of our news releases available to reporters 24 hours a day, CUBB also offers the latest versions of the Clemson Daybook and Press Memo.

Reporters dialed into CUBB via computer more than 800 times during this fiscal year, and we expect that number to increase as we expand the service and marketing efforts. In addition, CUBB is attracting interest from users in the general public.

Electronic document delivery continues to be a growing service. In addition to CUBB, we began operating an Internet gopher server in the second half of FY '93-94 and a Worldwide Web server one month ago. Although we have been offering our news releases, the *President's Letter*, Kellogg initiative documents and selected news stories from *Inside Clemson* via Internet gopher since late calendar year 1993, we were not able to log connections to the server until we updated software in June. During the month of June only, a minimum of 4,859 connection readings were recorded. Nearly one-half (2,174) of those were attributable to Clemson users (indicating that internal communication is increasing and improving). The remainder came from other educational institutions, government organizations, military installations, nonprofit organizations, foreign countries and other sources. Use of the Worldwide Web server will not be known until early in FY '94-95.

Each professional staff member keeps a daily log of media contacts. While the primary purpose is to quantify contacts, the log also serves as an ongoing staff report on media interest areas, trends and other pertinent information. In FY '93-94, News Services staff members made more than 2,500 media contacts to local, state, regional and national media outlets.

News Services distributed about 500 news releases during the year, not including the more than 2,030 hometown news releases recognizing more than 9,550 people (primarily students) for honors and achievements.

More than 60 national media outlets carried Clemson stories in FY '93-94. The Clemson employees and information featured were:

- National AP special packets — BIOCUM.
- National AP special packets — cross-age tutoring.
- National AP special packets — dorm life.
- National AP special packets — "moving in" feature photo.
- CBS Evening News — Dale Linvill — drought.
- *National Wildlife* magazine — TIWET/golf courses.
- *New York Times* — Sweetgrass.
- *Washington Post* — Carol Ward — Mae West.
- CNN — Gingrich course.
- Voice of America — Peter Sparks — hurricanes, wind research.

- Multiple outlets (including *USA Today* and ESPN) — new NFL team to play at CU.
- *USA Today* — Faculty senate vote on sexual preference resolution.
- *USA Today* — Robert McCormick — economic impact of football.
- *People* magazine — Shillie Turner (track recruit).
- National Public Radio — cemetery dig.
- National AP special packets — Bob Testin — environmental Christmas.
- American Public Radio — CU research on pond levelers to correct beaver problems.
- *Washington Post* — Archbold Center (John Archbold obit).
- *Chronicle of Higher Education* — dismissal of Shannon Gill lawsuit against Clemson.
- *Smithsonian* magazine — College T-shirts/Clemson (feature photo).
- *USA Today* — Nature-based tourism.
- Salt Lake City — Don Fuhr — education op-ed.
- National AP — John Wourms on evolutionary biology and fish.
- National AP — Ag source — woodpeckers.
- National AP — John Meriweather — research work in Alaska.
- *Chronicle of Higher Education* — Bob Gilliland and CU — patent income.
- *Chronicle of Higher Education* — Mileage compensation for CU vice presidents.
- *Fortune* magazine interview with Dr. Lennon and Dr. Gogue re: I-85 corridor.
- U.S. High Tech Report — Professor Gene Haertling's Rainbow audio invention.
- Businesswire — CU mentioned in story re: Comfort Inn to be built in Clemson.
- *LA Times*, *San Francisco Chronicle*, *San Jose Mercury News*, multiple national Hispanic media — National Dropout Prevention conference.
- German magazine *Stern* — CAR — chemical warfare suits.
- *Golf Course News* — CU's golf course.
- *USA Today* — Heisman memorabilia auction — CU mentioned.
- Landscape Architecture — Professor John Acorn's garden.
- Architecture magazine and national AIA newsletter — Professor Harlan McClure's Topaz Award.
- *Washington Post* wire — Professor Tim O'Rourke — redistricting.
- *Washington Post* wire — Professor Wayne Marr — Financial Economics Network.
- AP/Washington, D.C. — Joy Smith — speech codes on campus.
- *U.S. News & World Report* — Professor Bill Lasser — Supreme Court justice choice.
- *Science* magazine — BIOCOM re: science teaching.
- National AP — Professor Alan Schaffer — Confederate flag.
- Businesswire — Tom Zimmerer — UniComp Inc Bd (former CU prof/CU in story).
- *New York Times* — Dudley Blair — foreign M.B.A. programs.
- *New York Times* — Forestry professors Tom Straka, David Van Lear — eco-tourism.
- *Chronicle of Higher Education* — Chuck Dunn — Fulbright program.
- Good Morning America — Professor Emeritus George Means — D-Day.
- National PBS — on-campus taping CU math professor Frances Sullivan.
- *Newsday* — Greg Wilson — Bible info.
- National Public Radio — Lorin Toepper — eco-tourism.
- *St. Louis Dispatch* — Bud Bodine — shark cartilage.

- CNN — CU alumnus — environmental management of golf courses.
- Other: national trade publications Apparel Industry, Education — Clemson Apparel Research, College of Education.

The Clemson Daybook is sent by fax or computer electronic mail to more than 20 media outlets daily. In addition to listing campus events, the daybook lists sources at Clemson who can provide information on breaking news stories. This year, the daybook provided information on 410 events and 168 sources.

A weekly memo to media lists upcoming events for the following week. In FY '93-94, 45 press memos, detailing 310 campus events, were sent to 52 media outlets across the state.

At the beginning of FY '93-94, the internal constituents' communication program was merged into the Department of News Services. The two staffs (external news and internal news) successfully adapted and met the objective of forming one, more cohesive and compatible staff with respect to flow of information and communication technologies. The internal news director developed solid working relationships with the staffs of numerous University departments, including personnel management and development, facilities planning and design, facilities maintenance and operations, and public safety. Internal communication activity during FY '93-94 included:

- 24 biweekly issues of *Inside Clemson* employee newsletter.
- 8 issues of *This Month at Clemson* community calendar.
- 31 special communiques distributed as *Inside Faxes* and electronic-mail notices.
- 14 Campus Alert bulletins for the Department of Public Safety, ranging from notices of break-ins and other crimes to educational pieces on personal safety and consumer awareness.
- 16 issues of the *President's Letter* in assistance to President Lennon.

Challenges for FY '94-95:

- Communication needs related to:
 - the selection and introduction of a new president,
 - the reorganization of the University, and
 - implementation of a two-year budget reduction plan.
- Positive publicity for Clemson University throughout the state, particularly in Columbia when the Legislature is in session.
- Better internal communication with all faculty, staff and students and improved relationships with leaders of all internal constituencies.
- Positive community relations and communication.
- Development of systems to make all hometowners available electronically to media.
- Pursuing merger of news services and agricultural communications.
- Budget reduction and redefinition of all staff members' job descriptions.
- Improving feedback to deans about our work on behalf of their colleges.

Communication Center

FY '93-94 was the first in which the full impact of the loss of our two-person art department and two photographers was apparent. We have been most interested in totaling up the year-end numbers so that we could quantify the impact. The results are heartening. Though we lost 15 percent of our staff, and we no longer

offer art and graphic support or certain photographic services, the number of Communications Center work orders (5,225) reflect only a 10 percent decline.

The new Communications Center rate card went into effect in September 1993 and as a result, we collected more than \$30,000 in equipment usage charges which will be used to maintain, replace and repair our facilities. Our major concern continues to be our declining operating dollars. As budget cuts take effect, we become more and more dependent upon attracting outside grants and contracts which allow us to continue our basic operations. The danger we guard against is that we may become so dependent upon outside grants and contracts that insufficient capacity remains for our on-campus clients.

We are in the second of a three-year program to finish the Extension Video Network and to make it compatible with the new state satellite system as well as with national and international suppliers of satellite transmissions. During this fiscal year we installed two additional downlinks in county offices and secured the funds to retrofit 34 downlinks to become compatible with the new state system.

After purging old titles and adding new ones, the media library increased its total holdings by 195 titles and continues to handle approximately 40 transactions per day. The audio-visual equipment loan service complied with an average of 82 requests per week. In addition, our one-person department continued to supply projectionist service an average of four times a week. Late in the year, an engineering maintenance technician was added to our staff through funding from the Provost's Office. This new engineer working together with our existing engineering staff and with our audio-visual equipment loan manager, will have responsibility for installation and maintenance of teaching and learning resources equipment in all campus classrooms.

This is the first full year that reflects the impact of the addition of the satellite utilization coordinator. This year, just as last, the number of counties and departments utilizing their satellite reception capability has increased dramatically as did the number of hours which were received and distributed on campus to faculty, staff, students and client groups.

Though we keep no records on satellite use in the county offices, the dramatic increase in on-campus use is reflected by a 22 percent increase during last year. This year we also have seen an increase in the number of locally originated video-conferences directed at Extension staff and clientele. Nearly 55 hours of video transmissions were uplinked to sites across the state. Our video duplication activity continues at a maximum capacity of about 100 in-house copies per week. Another 60 copies per week were produced out of house.

The continuing emergence of high quality, portable, high-screen video projection is reducing the call for multi-image production. Many of our traditional multi-image clients are now requesting that we produce their messages on videotape. However, it should be noted that we will continue to produce and update several three-projector shows for major events as well as student orientation and faculty/staff orientation.

Audio and radio production efforts included more than 50 soundtracks, 312 "Plant Professor" radio programs which were aired daily on more than 30 stations, and 12 programs which aired on the S.C. Educational Radio Network.

Our monthly TV program, "Cue Video Magazine" is produced totally in-house and is broadcast by 23 commercial and cable stations in nine major markets from Atlanta to Wilmington and from Asheville to Savannah. Totalling the number of households in the area of dominant influence in the nine markets, indicates that "CUE Video Magazine" is available in nearly 3.5 million homes in South Carolina and surrounding states. In addition, county Extension personnel use segments edited out of the program in their local outreach efforts.

There was a significant increase in video production in FY '93-94. 901 program units were produced, 12 percent increase more than our output in FY '92-93 and 73 percent increase more than our output in 1989-90. The classroom studio increased its output from 12 hours of programming per week to 13, including 500 hours of live telecampus courses. The field production unit remained steady at about seven programs per week.

Despite the reduction in its force, the photographic services unit continues to turn out a highly credible quantity of work while maintaining and improving its quality standards. The unit completed 4,278 work orders accounting for more than 68,000 color transparencies and 15,000 black and white images which were used in a variety of public information, research and instructional publications and settings.

The Communications Center is pleased to be able to provide services to divisions, colleges, departments and administrative units across the University. Our services are provided in support of their instructional, administrative and outreach activities. Our staff consistently receives high marks from our clientele for our customer-oriented approach to quality service and products.

Despite the downsizing in personnel and in operating funds, the Communications Center has been able to maintain its quality standards and in most areas, increase the quantity of its output. As other departments across the campus face financial reality, we may find that our client base may well choose to spend their declining dollars on other necessities. However, as we enter '94-95 we are challenged to provide better quality and more cost-efficient service.

Publications and Graphics Services

This year was one of change for the Department of Publications and Graphics Services. Through the reorganization, five employees moved into the department, three from Constituent Communications and two from University Relations.

The first challenge was to provide office space for them and to integrate their computers into our system and to make their computers and software compatible with ours. That has been accomplished.

The second challenge was to evaluate job functions within the department and make work assignments that would be compatible with individual skills and departmental needs.

Several items were identified in the production area that needed attention. Last year, purchasing procedures changed, bids for printing more than \$2,500 were bid by the purchasing department, the ceiling was raised to \$10,000. That meant those printing jobs that cost from \$2,500 - \$10,000 now are bid through P&G, 70 percent of the jobs that had been processed through purchasing now are processed through P&G. Second, in these tight budgetary times, the need for estimates for print costs has become increasingly important. Even with the computerized estimation program, it is still time consuming. Third, we forward printing invoices to clients for payment, but we discovered that clients were not paying printing bills and that no tracking system was in place for us to monitor invoice payment. Fourth, dramatic increases in mailing costs are having a tremendous effect on the cost of direct mail, that coupled with the complexity of postal regulations has an ever-growing impact on the publications business.

To address these challenges, we have reassigned various production tasks to Jan Wright and Kathy Jenkins to help with the increased workload due to the purchasing procedure changes. Jan is now working with John Mounter to track invoices. Kathy Jenkins has taken over the estimation system. This fits well with her knowledge of postal regulations as she sees jobs at a very early stage and can make recommendations for cost-efficient mailings. We also are utilizing Kathy's expertise in postal regulations for all our clients now; she analyzes projects and makes recommendations as well as being our representative in appeals to the U.S.

Postal Service. If a mailing is rejected, or our clients are over-charged, she handles the appeal process. Savings to the University because of this new client service was more than \$10,000 this year.

In FY '93-94, the department completed 421 jobs, and carried more than 67 jobs into the next fiscal year. This reflects a stabilizing of the number of jobs produced by the department. This year, expenditure for printing placed through P&G was \$584,544. (Although this is an increase over last year's \$506,822, the amount is impacted by the numbers of issues of *Clemson World* magazine and the one issue of *Clemson World News* that was printed in this fiscal year.)

The inaugural season of the Brooks Center caused a high demand for promotional and direct mail pieces. Last year we produced 38 publications for Performing Arts at a cost of \$38,503; this year we produced 57 publications at a cost of \$42,906.

We continue to move forward with marketing-oriented admissions materials. This year we added a series for undergraduate recruiting in horticulture based on focus group and student participation. Due to proposed budget cuts, we completely redesigned and downsized Consider and Choice to come into line with a 50 percent budget cut. However, upon seeing the sacrifices necessary to stay within the budget, funds were restored. We redesigned Choice and updated Consider to respond to the restored budget, however time restraints made it impossible to pre-test the pieces. We will post-test them this fall.

This year our largest client in number of jobs was Liberal Arts (including the Brooks Center) with 79 jobs, followed by Academic Affairs (admissions/financial aid) with 74 jobs, Development with 49 jobs, Student Affairs (housing and student development.) with 35. Total number of jobs for the colleges totaled 148. (Liberal Arts was highest, followed by Forestry with 20 jobs and Agriculture with 15.)

In dollars spent for printing*, the largest client was Academic Affairs with \$177,558, followed by Development with \$87,169, Liberal Arts (including Brooks Center) \$50,356 and Student Affairs with \$47,420. Total expenditures by colleges was \$54,279 without the Brooks Center, and \$97,185 if Brooks Center is included in calculation. (*does not include *Clemson World*.)

Because of the addition of staff members, our computer network was made obsolete, (its capacity was 10 work stations). During the course of the year we connected to the main University system and E-Mail. Most of the computer budget for the year was spent on the computer hardware, software and memory upgrades necessary to accommodate the larger staff and to connect us to the network.

The department won a PICA Award, Best in Category of Institutional Promotion for the *President's Report*; two national CASE Awards; a gold for the Shakespeare Festival Package and a bronze for Peter Rabbit's Birthday Poster. (We did not enter the regional CASE Award competition this year). Dave Dryden was elected to the UCDA (University and College Designers Association) national board of directors, and Anita Albert again was invited to be a faculty member for CASE Design Institute.

Clemson World

On July 1, 1993, *Clemson World* magazine became the responsibility of P&G. The magazine was completely revamped and redesigned, and the first issue was in the mail in October.

The total printing cost of the three issues of the magazine produced in FY '93-94 was \$128,000 at a per unit cost of .60 cents per magazine. Advertising revenue was \$36,724, well above the estimated revenue of \$20,000.

Response cards (fall issue through July 7) total 536, in addition to career and family information; they have included:

- 259 address changes.
- 45 prospective student recommendations.
- 40 requests for information about forming an alumni club in their area and/or offers to represent Clemson at college fairs.
- 86 percent of the responses are from 1970s and after, with the highest responses from the 1980s.
- In addition to response cards, more than 100 letters, calls and visits.
- Class notes have grown by more than 200 percent and birth announcements by more than 300 percent.
- Five departments have requested reprints of articles from the magazine for promotional use.
- Requests for cover photographs have resulted in making them available for sale through the Alumni Association and Communications Center.
- Faculty and staff responded to a request to return their magazines through campus mail for other uses resulted in more than 400 copies being returned. That is more than 10 percent participation. The extra copies are available to parents, prospective students and visitors through the Admissions Office, Visitors Center and orientation.
- Alumni are submitting stories and story ideas. Half the profiles in "Classes" Summer issue came from alumni, and Tom Anderson will be writing the main feature for spring 1995.
- 235 gifts to the Clemson Fund through the return pledge envelope in the magazine totaled \$52,287, plus \$17,849 in corporate matching for a total of \$70,136. Although the numbers are low, the trend is meaningful, as the gifts are coming from the same segment of the audience who is using the response cards; 66 percent of the gifts are from classes of 1960 and up, with 47 percent from the 70s, 80s and 90s, and the largest number come from the 1980s — 25 percent of the total number of gifts. Nearly half of the gifts are unrestricted. And although only 25 percent of our alumni live outside the states of Georgia, North and South Carolina, 40 percent of the gifts came from outside those states.

Development

The Clemson Fund

The Clemson Fund receives all private gifts from individuals (alumni, faculty, staff, friends and parents), corporations and philanthropic foundations to all areas of the University. Gifts can be unrestricted or restricted to annual operations, endowment or capital needs.

Eleven separate annual fund drives were conducted for each of the nine colleges, the library and Student Affairs. Solicitations included a combination of mail solicitations and phonathons with an Annual Gift Club emphasis. These dollars will support faculty aid, student aid, University-wide programs and other current needs determined by the college deans. Student Affairs will solicit seniors and parents.

Gifts to the endowment come from individuals, corporations and foundations and are used to establish new endowed programs or may be added to existing ones. Endowments support named restricted programs for faculty positions (chairs, professorships, lectureships), student aid programs (Presidential Scholars, named restricted scholarships) and other program endowments.

Capital gifts support new and existing buildings, class projects and equipment for new and existing laboratories.

Planned giving is being promoted aggressively to build the inventory to \$75 million by the end of 1997. A targeted prospect list of 6,000 has been developed. The *Horizons* mailers have been sent three times this year to this list, encouraging the support of Clemson's alumni through bequests, trusts and other planned giving instruments.

Primary Gifts Committee

The Primary Gifts Committee was chaired in FY '93-94 by Frank S. Barnes, Jr. The committee is staffed by the associate vice president for development and also includes the president, vice president for institutional advancement, senior director of development and the director of administration services and budgets as ex officio members of the PGC.

Eight of the nine colleges have a person from their constituency to serve as their representative on this committee. In addition, the PGC has 12 at-large members. The committee met four times and held four conference calls.

FY '93-94 Summary

Private gifts to Clemson reached an all-time high of \$20,666,180, an increase of 9 percent in gifts during the previous year of \$18,973,474. Support from alumni, faculty/staff, corporations and trusts were ahead of the year before. Friends, parents, corporate matching, foundations and associations did not exceed the previous year's total.

Alumni giving was \$5,958,266 compared with \$4,429,588 last year, a 35 percent increase. Corporate support was 47 percent ahead of the year before and totaled \$8,348,044.

Restricted gifts to Clemson totaled \$20,011,308, or 97 percent, leaving \$654,872 designated by donors as unrestricted.

The cost to raise a dollar in FY '93-94 was 10.55 cents per dollar.

Membership in the Annual Major Gift Clubs decreased in all clubs: Presidents Club — 917 (24 percent decrease), Clemson Fellows — 86 (7 percent decrease), The Founders — 137 (21 percent decrease).

Lifetime Major Gift Societies (Clemson, Calhoun, Tillman, Benefactors and Legacy) increased 6 percent to a total of 335 members.

Planned Giving is an important aspect of Clemson's fund-raising program. In FY '94, \$1,007,011 was received in deferred gifts from individuals. This figure represents 14 percent of the total received from individuals. During the year \$5,536,154 was recorded in deferred gifts (\$2,853,296 — bequests; \$2,682,858 — trusts and insurance). The deferred gifts inventory totaled \$41,747,167 as of June 30, 1994.

Goals for FY '94-95

A goal of \$21 million has been set for gifts to be received along with a pledge goal of \$4.5 million. The combined goal is \$25.5 million.

Major Individual Gifts

Alumni, parents, friends, faculty and staff made gifts of \$8,871,173 in cash or cash equivalents in FY '94. This total includes outright and matured deferred gifts as well as employee matching funds. Trusts and life estates are recorded in the year in which they are irrevocably given.

Gifts from individuals represent 43 percent of the total private support. These gifts support chairs, professorships, scholarships, fellowships, programmatic

needs, the library and other special projects. The top 43 gifts (\$25,000+) totaled \$5,998,517 and represented 68 percent of all individual gifts in FY '94.

New Endowed and Annual Programs

For FY '93-94, 52 new endowed programs, one new capital program and 14 new annual programs were established. When fully funded, the endowed programs will add approximately \$7,446,108 to the endowment of the Clemson University Foundation, and the capital project will add approximately \$500,000. New annual programs will contribute \$44,200 to Clemson's academic mission. Twenty-five agreements were written for existing funds as part of our effort to expedite the administration of these programs. Sixty-four agreements are pending donor approval for completion.

Annual Giving

The Annual Giving area continues to solicit gifts by college. Though alumni total dollars given increased by 35 percent, alumni percentage participation fell to a low of 14 percent. Budget cuts resulted in less elaborate printed solicitations and donor recognition. Clemson is following the national trend for increases in donations failing to keep up with increases in costs.

For the coming year, very special efforts will be made through phonathon and direct mail to bring the smaller gift donors back into the fold.

Facts of Gifts from Individual Donors

- 11,621 individual donors made 16,162 gifts totaling \$8,871,173 in 1994, a 7 percent decrease in dollars. In 1993, 12,907 donors made 18,102 gifts totaling \$9,501,192.
- 14 percent of Clemson alumni on record made gifts to Clemson's academic programs — a decrease from 17 percent in 1993 and 21.4 percent in 1992.
- Gifts from alumni increased 35 percent to \$5,958,266 from 10,849 gifts as compared with 12,881 gifts totaling \$4,429,587 in 1993.
- The number of gifts from friends increased from 1,302 to 1,466, resulting in a 51 percent decrease in dollars totaling \$1,875,612.03.
- The number of gifts from parents increased from 288 to 331, resulting in a 68 percent decrease in dollars totaling \$61,770.
- The number of gifts from corporate matching firms increased from 2,470 to 2,509, resulting in a 14 percent decrease in dollars totaling \$768,260.
- The number of gifts from faculty and staff decreased from 1,161 in 1993 to 1,007 but resulted in \$207,265, a 14 percent increase from 1993.

New Donor Facts

- 1,614 first-time gifts totaling \$1,090,095 were received from alumni, friends, faculty, staff and parents.
- The naming opportunity afforded seniors in the 1993 Senior Plaque project had greater appeal than the 1994 Senior Gift which did not offer this feature. A total of 661 new senior donors gave in FY '93 and 27 in FY '94 to the 1993 Senior Plaque project vs. 35 new senior donors who gave to the 1994 Senior Gift.

Student Phonathon

For the first time in phonathon history, donors pledged 50 percent fewer dollars than they had given in the previous year. Other facts include:

- \$366,599 was received from 4,343 phonathon donors (contacts who responded).
- \$577,376 was received from 5,785 or 17 percent of all phonathon prospects attempted in FY '94.
- Of 759 new alumni gifts, 235 (31 percent) resulted from phonathon contacts.
- Alumni who declined to pledge over the phone in FY '94 (refusals) returned \$56,957 in gifts, or 34 percent more than FY '93 receipts of \$37,461 from the same group of donors.
- Alumni who were attempted, but missed, returned \$210,777.

Completed statistics in the last two categories listed are not available for FY '93. New reports will allow us to track these behaviors in the future.

However, the large dollar figure received from missed contacts combined with callers attempting 10 percent more and connecting with 23 percent fewer alumni than the previous year attests to the difficulty of getting to speak with the constituents. Clemson graduates are using more advanced telephone technology in their own homes (various answering machine/voice mail devices) than the callers have in their workplace.

Special Projects

Requests for Special Projects operated by the Annual Giving staff continued to increase with the University-wide budget decreases and the increased awareness of restricted giving opportunities through the new, college-targeted approach for annual gifts. A close affiliation with student organizations also provided opportunities for smaller targeted projects.

Examples of current special projects are the classified staff scholarship, Library Friends, CUTBA, student clubs and any reunion class project.

Major Gift Clubs and Donor Relations

During FY '93-94 the Office of Donor Relations has provided a comprehensive program of Major Gift Clubs and cumulative gift society levels, donor recognition and stewardship reporting, ultimately promoting financial support of Clemson University and giving individualized attention to the University's major donors.

Clemson's three major gift clubs were established in 1984-85 with several options for membership qualification. Many memberships were based on 10-year pledges. In FY '87 a policy was implemented to base major gift club qualification on one's annual contributions during a given fiscal year. However, gift club members who qualified in 1984-85 became charter members when membership policies changed, and they will remain charter members for their lifetime as long as the membership pledge is fulfilled or in good standing. Charter members may change gift club membership status on an annual basis within a fiscal year. For this reason, the number of charter members for each gift club may vary from year to year.

Although there was no overall increase in major gift club memberships in FY '94, there was activity within the levels from FY '93. Observation of gift club memberships indicates that a number of gift club memberships were not renewed in FY '94 because of pledge fulfillments in FY '93, support to specific projects for a designated time frame and a decrease in corporate matching support. There also was

a decrease for society and gift club memberships because of the death of several members.

Cumulative Gift Society Membership

The cumulative gift society levels are:

Thomas Green Clemson Society.....	\$1,000,000 or more
John C. Calhoun Society	\$ 500,000 - \$ 999,999
Benjamin Ryan Tillman Society.....	\$ 100,000 - \$ 499,999

Benefactors of 1889 membership qualification is when total cash contributions to Clemson reaches \$50,000.

Clemson Legacy membership comprises members who document a bequest of \$100,000 or more or name the Clemson University Foundation as owner and beneficiary of a life insurance policy for \$100,000 or more.

Major Donor Relations Objectives Accomplished

- Planned, directed and administered the Major Gift Clubs and Cumulative Gift Societies program.
- Produced, published and distributed the 1993 Annual Endowment Report.
- Provided stewardship services regarding donors' gifts to Clemson University.
- Maintained PC data base for each individual gift club and society member.
- Communicated in a timely and effective manner with major donors.
- Planned, coordinated and administered Major Gift Clubs annual dinner.
- Researched and selected premiums adhering to IRS regulations for cumulative gift societies to be presented at the 1994 Major Gift Clubs annual dinner. Planned, coordinated and hosted breakfast for Major Gift Club members attending Reunion '94.
- Hosted Major Gift Clubs hospitality suite in Memorial Stadium for '93 football season. Assisted with farewell reception for President and Mrs. Lennon.
- Initiated audit of pledges for charter members of the three major gift clubs.
- Maintained contact for donor recognition exhibit of Tribute Through Trees.

Summary

The Office of Donor Relations continually strives to complement and assist in the fund-raising efforts of the Office for Development by serving as an ambassador for the University and promoting support of its academic programs, by serving as a liaison for Clemson University and major gift clubs and society members regarding their gifts to Clemson, and by creating and strengthening positive relationships and providing donor satisfaction.

Planned Giving

Bequests

Included within this category are nine new documented gifts and five undocumented bequests to the Clemson University Foundation. The total amount was \$3,113,007; however, four of these bequests were recorded and realized in the same year.

Insurance

This category accounts for gifts designating the Clemson University Foundation as owner and beneficiary of the policy. Two new gifts were received totaling \$60,000.

Corporate Support

In FY '93-94 gifts from corporations totaled \$9,116,503, increasing 28 percent from the previous year. Cash contributions showed an increase of 26 percent and totaled \$6,183,999. Gifts-in-kind also were up by 14 percent with \$2,164,044 worth of equipment given for teaching, research and extension. Corporate matching of employee gifts was down slightly by 14 percent when compared with last year. Companies matched \$768,260 in employee gifts.

With the increasing relocation of manufacturing facilities in South Carolina, the desirability of Clemson graduates as new hires and the entrepreneurial ability of the faculty, corporate support will continue to grow. Corporations are becoming increasingly more selective when deciding what schools to support. For the reasons above, Clemson will remain a priority institution for companies to invest in its students and faculty.

Employee Matching Gift Programs

Individuals have contributed, through corporate matching programs, a total of \$768,260 in FY '94. This represents 8.7 percent of the total \$8,871,173 given from individuals and employee matching for the fiscal year. The top eight corporate matching gift companies (\$10,000+) totaled \$507,976 for the year.

Proposal Activity

- Of the 131 proposals delivered by the Office for Development staff, 40 percent have received positive responses, and 42 percent still are awaiting final decisions.
- During FY '93-94, 131 proposals were delivered requesting more than \$19 million. Since 1988 there has been a 296 percent increase in the number of annually delivered proposals.
- Confirmations to proposals resulted in more than \$5 million in support. This total represents an average of 88 percent of the amount "requested."
- Of the 131 proposals delivered this year, 76 have been confirmed or denied as of June 30, 1994, and only 18 percent have been denied.

Foundation Support

- Gifts from foundations and associations totaled \$2.9 million in support of academic programs and scholarships.
- The number of foundations making gifts increased by 16 for a total of 97.
- The total number of gifts from foundations and associations increased 15 percent from 307 to 348 donors.
- Visits to six national foundations were made: Lettie Pate Whitehead, Abney, I Have a Dream, Schlumberger, MRP/Andrus and Hearst. Campus visits by foundation program officers included: Close, Muller, Max and Victoria Dreyfus, Self, Kellogg, Hitachi, Ramussen, Camille and Henry Dreyfus, and Toyota.

Clemson University Foundation Board of Directors

The Foundation held four full board meetings: August (Hilton Head), November (Clemson), February (Clemson), and May (North Myrtle Beach). Expenditures

were closely monitored in FY '94, and approximately \$2,000 was saved in meeting costs.

In an effort to maximize involvement and awareness of University priorities and needs, the board of directors was expanded from 24 elected directors to 36 during the next four years. Three new directors were added in FY '94. A faculty senate representative also was granted status as an ex-officio director.

The number of nominations rose to 95-100 in our continuing efforts to aggressively identify viable individuals to serve on the board.

Information Management

FY '94 was a pivotal year for Information Management. The department continued to provide quality service while constantly searching for ways to streamline and maximize efficiency in serving our constituencies.

The implementation of the new relational data base was successfully completed in October and training was made available to all users. Programmers received extensive training in the use of Standard Query Language (SQL) which is required to operate the new system. A supplemental retrieval file, known as a flat file, was utilized to process requests for information. More than 550 new programs were created in SQL and the flat file to respond to internal and external requests.

The total data base houses 98,883 records which include 80,029 alumni files (8,432 deceased), 11,494 non-alumni files, and 3,663 organization and foundation files. Lost alumni total 3,365, representing 4 percent of all actual alumni records. Initial steps were taken to secure address correction information electronically. Priority will be given to this project in the first quarter of FY '95 to maximize the use of electronic transfer of information and reduce the cost of address corrections.

DBase programs were utilized to manipulate and facilitate short-term information needs — 19 independent applications now are in use for a variety of programs in the Development Office.

The new Clemson Alumni Directory was completed in the fall. The plan for a national prospect screening and evaluation program was revised and stands ready for implementation, and the prospect tracking system was expanded and improved to coordinate all fund-raising activities.

Donor Research

Donor Research continued to meet the research needs of both internal and external constituents. A total of 218 research profile documents were completed: preliminary—82, individual—2, corporate—2, foundation—2, biographical sketches—125 and strategy memos—5. The names in the key prospect data base continued to be assigned to development officers. Of the 1,400 suspects and prospects identified, approximately 700 were analyzed and distributed to the development officers.

Investigation of an electronic imaging and filing system for the Research Center is ongoing. The center is at maximum capacity for storage. This analysis will continue throughout FY '95 until the most cost-efficient system is identified. Foundation funds in the amount of \$22,135.51 were carried over for the purchase of an imaging system.

Gift and Asset Management

Gift Processing and Reporting

The primary focus of this group continues to be centered on timeliness, accuracy and efficiency in daily gift receipting and depositing as well as refining financial and audit controls.

Programming, testing and implementation of the updated gift system were completed during this year. Additional efficiencies have been provided to the matching gift program, daily bank reconciliation process, daily gift logs, as well as streamlining the monthly and annual financial reporting process. Users of daily gift information have benefited from the combining of the two previous systems used to process and report gifts. Staff expertise in mainframe, gift system capabilities and PC applications continues to increase and provide efficiencies.

Year-end reconciliation with Foundation accounting records, University gift reports and year-end fund-raising reports have been streamlined.

Financial Analysis and Planning

Summarized annual budgets for endowments were submitted to colleges and departments by March 1 to aid colleges in financial planning for the fiscal year. In addition, weekly and monthly gift reports are distributed to departments and colleges. Comparative gift reporting by year, use and donor status, as well as pledge information, are supplied to colleges and departments periodically.

Gift segmentation figures, fund-raising cost, endowment and real estate management are highlighted below and presented in greater detail elsewhere in this report.

- Efficiency in gift processing continued as gift revenues rose an additional 9 percent in FY '93-94. Gift income has increased more than 100 percent since 1987-88. The total private gifts for the year ending June 30, 1994, was \$20,666,180 compared with \$18,973,474 in 1993, and \$10,311,409 in 1988. This figure represents 17,451 gifts, which averaged \$1,184 per gift.
- The cost to raise these funds remains below national averages. The cost to raise private dollars at Clemson in FY '94 was 10.55 cents per dollar. The NACUBO Benchmark Survey of 1992 indicates the median cost to raise a dollar is 16 cents.
- The Investment Committee reviewed all fund managers during their annual meeting scheduled with each manager. The asset mix as well as projected risk/returns on various mixes and management styles were reviewed during the year. A revised endowment spending policy based on the optimum asset mix and projected market returns was approved by the Investment Committee and academic deans during the year and, with Foundation board approval, will be implemented during next year.
- A new revenue budget model for the unrestricted budget was implemented during FY '93-94. This revised model allowed the endowment allocation process to be updated and streamlined. Preliminary results from the revenue budget are on target for the year.
- Local checking, short-term investments, financial services and custodial services for the Foundation were reviewed during FY '93-94. As a result, short-term cash was segmented and invested separately to increase returns on short-term funds.

Real Estate Foundation

The Clemson University Real Estate Foundation is an independent 501(c)(3) not-for-profit public charity which serves as an affiliated organization of Clemson University and the Clemson University Foundation. It seeks to advance the University by providing an efficient conduit through which gifts of real estate and property are received and liquidated.

During FY '93-94, the Foundation received four parcels of real estate totaling \$1,355,500. In addition, the Real Estate Foundation sold eight parcels during the

year for a total of \$1,562,466 and is currently maintaining an inventory of 18 parcels valued at \$1,039,250.

Endowment Management

The managed endowment pool in the Clemson University Foundation experienced growth primarily as a result of new gifts. The total endowment pool was valued at \$66,676,439 on June 30, 1994, up from \$62,176,098 one year ago. Investment strategies helped maintain endowment principal during a difficult market year. The managed pool experienced a combined return of 2.2 percent for the 12 months ending June 30, 1994. Equities returned 3.6 percent, while fixed income investments experienced a negative return of (1.3) percent for the year. This return was recorded in a year in which the Standard & Poor's 500 Index rose 1.2 percent, the Lehman Brothers Government/Corporate Bond Index returned a negative (1.5) percent, and the Consumer Price Index (Inflation) rose 2.4 percent.

The return on the Foundation's managed pool endowment placed it above average for managed funds with a 65 percent equity/35 percent fixed income asset mix for the past year. The pool continues to rank in the top decile for the past three years and has returned an annualized rate of 10.3 percent per year during the past five years. The median return of the benchmark fund (65/35 mix) was 1.2 percent for the year ending June 30, 1994, while the five-year return is 10.1 percent.

The Clemson University Foundation's total pooled assets also include Foundation-managed annuities and life income funds as well as other income and non-income producing assets, principally in short-term instruments and real estate. Clemson University and the state treasurer hold additional endowment assets of \$19,341,945.

The market value of these combined endowments, annuities and life income funds was \$86,018,384 on June 30, 1994.

Alumni Relations

The Alumni Relations program focused on maintaining alumni involvement through programming and services while adapting to reductions in budget and staff. The following outlines the accomplishments of the past year by department:

Office of Associate Vice President

- The Alumni Relations strategic plan was completed and approved by the Alumni National Council. An annual milestone report was written from the strategic plan and used for quarterly updates to the board.
- Work continued with the class of 1944 Visitors Center. An architect was chosen and preliminary design work completed. Ground was broken for the facility during Reunion 1994.
- Actively participated in the redesign of the *Clemson World* magazine and in the *Clemson World* editorial board.
- Oversaw the successful merger of the Historic Houses department and the Visitors Center into the Department of Visitor Programs.
- Programs and services were offered without exceeding either the state or private budget.
- Liability insurance was acquired for the Alumni Association.
- A policy governing the formation and operation of alumni groups was written and approved by the Alumni National Council.
- The department managed and/or participated in more than 500 alumni events during the year, both on and off campus.

- A Council of Presidents was formed to utilize former presidents of the Alumni Association.
- The Clemson University Club was formed to get alumni who are employees of the University more involved.
- A new director of field activities was hired.
- The Alumni Association co-funded the new University FACTS/map brochures.

Office of Assistant Vice President

Alumni Outreach:

- Coordinated 12 programs for alumni and friends through community meal clubs.
- Through interaction, assistance and financial contributions, supported alumni activities specifically for graduates of the Colleges of Agricultural Sciences, Architecture, Commerce and Industry and Nursing. The formation of "Alumni of the College of Engineering" (ACE) was announced and organizational meetings held.
- Continued involvement with the University's Career Center to offer career services to alumni.

Community Outreach:

- Continued service on Clemson's Chamber of Commerce.
- Served as committee chair for ClemsonFest '94, Clemson's first community festival.

Office Management:

- Managed Clemson Foundation budgets for alumni relations.
- Hired new clerical specialist and office receptionist.
- Handled search and purchase of new Alumni Association van.

Marketing Operations:

- Credit card — income exceeded \$225,000, the sixth consecutive year of growth in the six years of the program. Worked with bank officials to manage issues resulting from the merger of SCN with Wachovia and the resulting redistribution of credit cards. Total income for life of program exceeded \$1.15 million.
- License tag — program produced more than \$110,000 for scholarships through sales of more than 5,000 Clemson license tags. Multipurpose "buck slip" inserts were developed and have proven useful in marketing the program.
- Long-distance telephone program — due to a lack of timely reports and general communication, negotiations are under way to end the current contract and seek a new supplier of service. Despite these difficulties, this program generated \$6,000.
- Passport travel — through sponsorship of seven trips this year, the travel program generated almost \$3,500 in revenue in spite of the elimination of the travel director's position.

- Insurance — we continue to offer life, health and Medicare supplemental policies to Clemson alumni through American Insurance Administrators of Columbus, Ohio. Current year's income exceeded \$6,200.
- Alumni directory — the 1993 directory was distributed and customer service supplied as needed.
- Artwork — received the second of four prints from Jerry Locklair. Other prints continue to be available through marketing efforts.
- General merchandise — yearly Christmas ornament, a line of pewter items, afghans, ties, watches, rings, lamps, chairs and clocks continue in our merchandise line. New items are continuously being evaluated.

Office of Field Activities

Clemson Clubs:

- The Clemson Club program included seven summer meetings/functions; five scholarship golf tournaments; six fall/winter meetings; and 36 spring meetings.
- The University Club met three times.
- Reorganized the York County Clemson Club. The club has committed to sponsoring two \$500 annual scholarships and a \$25,000 endowed scholarship in three years.
- Seven high school recruiting meetings were held.
- Focus continued on the DC/Baltimore Alumni Board and alumni activities in the area.
- Eleven clubs received the Gold Award, one club the Silver Award, and six clubs the Bronze Award.
- Leadership Clemson '94 was a success with more than 200 alumni volunteer leaders attending, the largest total ever.
- We ended the year with 52 chartered Clemson Clubs.

Young Alumni:

- The YA Council held three meetings.
- Young alumni participated in all high school recruiting meetings and served on the panel.
- Young Alumni hosted more than 125 events.
- Fifty-one Thomas Green Clemson awards were presented to outstanding graduating high school students in North and South Carolina.
- Sixty young alumni attended the annual Young Alumni Fourth of July weekend at Hilton Head.
- The Young Alumni Memorial Endowment is fully endowed and now memorializes 12 young alumni. The total in the fund stands at \$8,110.

Alumni Away-Game Headquarters:

- An alumni headquarters was hosted at all away games. Pep rallies, socials and dances were held. The headquarters served more than 700 alumni and friends. The Peach Bowl events were extremely successful. The alliance with Linda Long Travel proved to be very successful.

Office of Constituency Programs

Women's Council:

- The full advisory board met twice during the year.
- A Women's Council scholarship endowment was established with a goal of \$25,000. To date, more than \$5,700 has been raised.
- The second edition of the *Women on the Move* newsletter was mailed to all members.
- A career networking reception was held for students in the spring.
- Seven Women's Council functions were held throughout the state and in Charlotte and Atlanta.

Student Alumni Council:

- Welcome Back Festival '93 was extremely successful. Fifty-two merchants participated.
- Membership drive attracted about 90 students to fill 15 vacant positions on the council; continued to encourage more diversity in the selection process.
- Senior Pig Pickin' was a success with approximately 700 attending.
- The Alumni Master Teacher was presented to Dr. Richard Saunders, history professor.
- David Poe was selected Member of the Year and Jeff Brown, Rookie of the Year.

Clemson Black Alumni Council:

- Sponsored a successful "Thirty Years of First" homecoming banquet. Approximately 75 attended.
- Alumni of Merit awards were presented to Jim Bostic and Sonya Stephens.
- An invitation to become a member of CBAC was sent to all black alumni. Currently 160 people have responded, representing 21 states.
- Three CBAC Executive Committee meetings held.
- Area representatives will be identified in Charlotte, Greenville, Columbia, Charleston, Atlanta, Raleigh/Greensboro, Easley/Clemson, New York/New Jersey and Washington, D.C.

Miscellaneous Constituency Groups:

- Clemson Alumni Dentists and Clemson Alumni Physicians held fall meetings.
- The Alumni Band held its annual homecoming event with approximately 300 in attendance.
- *The Tiger* staff alumni held their first-ever event with 70 in attendance.

Office of Special Events

- Managed 170 special events for the Alumni Relations area and other areas of Institutional Advancement and the University.
- President's box — managed the invitation list and seating arrangement for the 134-seat box for six home games, serving more than 800 people.
- Managed the selection of judges for the homecoming displays and the actual judging process. Coordinated the pregame activities involving the president of the Alumni Association and the homecoming queen.

- Developed and managed the reunion program for 1994. More than 800 attended all or part of the reunion weekend. Developed and produced a program to induct 125 members of the class of 1944 into the Golden Tiger Society. Arranged for the Alumni Awards Banquet with more than 630 guests. Coordinated the groundbreaking ceremony for the class of 1944 Visitors Center.
- Assisted the Jungaleers in planning their annual reunion.
- Worked closely with alumni of the Senior Platoon. Second reunion was held with more than 250 people in attendance. Committees have been identified and established. Work continued on writing the history of the Senior Platoon.
- Reunion events were managed for the following classes in addition to the summer reunion events: 1934, 1937, 1950, 1951, 1952, 1953.
- The major gift club black tie event was held in Hilton Head with 340 people attending.
- Assisted with the planning and coordination of four Clemson University Foundation meetings.

Visitor Programs

The Office of Visitor Programs focused on the smooth merger of the Visitors Center and the Department of Historic Houses, assuring that their facilities would remain open and accessible to the public, and their programs would benefit from the reorganization. The year's results are as follows:

Visitors Center

- Celebrated 10th anniversary. In 10 years, Visitors Center has offered services to 309,000+ people and arranged and conducted more than 8,300 tours of the University.
- For the past year, there were:
 - 26,349..... Walk-in visitors (1,783 more than previous year)
 - 547..... Prospective student tours (served 6,850)
 - 163..... Special tours (3,156 served)
 - 294..... School/community tours (10,968 served).
- Initiated two new tour programs: historic tour of campus and lunch in Harcombe Food Court.
- Coordinated efforts to redesign the campus map and FACTS brochure.
- Distributed 20,000 copies of FACTS '93.
- Continued on board of directors of Greater Greenville Convention and Visitors Bureau and Clemson Area Chamber of Commerce.
- Updated AUTOMAP program for directional inquiries.
- Continued operation of University's 24-hour information line – 1,557 calls.
- Marketed six University departments through exhibits in the Visitors Center.
- Participated in each monthly training session for new employees.

Fort Hill and Hanover House Historic Museums

- Served 15,489 visitors. Visitors Center arranged special tours for 2,666.
- Collected more than \$7,300 in donations and \$3,500 in sales.
- Celebrated 40th anniversary of partnership between Clemson and the Colonial Dames of Spartanburg.
- Moved Hanover House Museum to S.C. Botanical Garden in May. Oversaw all packing of antiques and handled interviews with local media.
- Private funding secured for installation of new lights in Hanover House.

- New air conditioner installed on first floor of Fort Hill; second floor to be air conditioned by end of July '94.
- Christmas holiday open house held at both historic houses.
- Taught four students in History 200 internships, oversaw two PRTM internships and supervised Ph.D. Applied History intern.
- Received two grants.
- Received pledge of \$50,000 for Fort Hill Endowment.
- Continued servicing research requests on Calhoun/Clemson families.

University Guide Association

- University Guide Alumni Association established.
- Initiated plans for "Project Brick," a fund-raising project for the new Visitors Center.
- Sport bottle fund-raising project initiated.
- Recognized as an official student organization by Student Government.
- Funds received by donor for plaques recognizing outstanding members of the association.
- First-ever University Guide Association-sponsored Spring Fling for the student body held at president's home in April.
- New logo designed for sweatshirts, stationary, business cards and banners.

Governmental Affairs

Appropriation Bill 1994

The 1994 legislative session ended on June 2 with the adoption of a \$4.1 billion budget. The budget included: a 4.36 percent average pay increase for state employees; \$47.3 million increase in E&G formula funding above the line (\$10 million recurring and \$37.3 million nonrecurring) and \$9 million for below-the-line programs such as SCAMP, EPSCORE, and the SE Manufacturing Technology Center; \$8.25 million by proviso to fully fund the pay raise: \$3.5 million for Clemson University PSA programs (\$1.6 million recurring and \$1.9 million non-recurring); \$236,000 by proviso for the Agricultural Education Teacher Training Program (\$59,000 recurring and \$177,000 nonrecurring).

Gubernatorial Vetoes

In an unexpected move, Governor Campbell vetoed the \$8.25 million fully funded pay raise proviso along with \$1.9 million in nonrecurring PSA funding for the Garrison Livestock Arena. Strategies currently are being developed to override these vetoes when the General Assembly convenes in January for the 1995 legislative session.

Higher Education Restructuring

The Office of Governmental Affairs was actively involved in the efforts to restructure the current state system of higher education. They joined the Council of Presidents, the Business Advisory Council, the Higher Education. Legislative Liaison and many other support groups in this initiative. These efforts resulted in the passage of Senate Bill 1366; however, the bill later died in a house sub-committee.

Special Legislative Committees

Governmental Affairs personnel worked very closely with the Joint Bond Review Committee, Joint Appropriations Review Committee, Legislative Black Caucus, Upstate Legislative Delegations and others, resulting in positive outcomes for programs, along with an increased understanding of Clemson University's unique mission as a state supported land-grant institution.

Legislative Advocates

This is a statewide network of Clemson supporters who have volunteered to serve the University as advocates for Clemson's legislative initiatives. During the 1994 session of the General Assembly, these advocates were more involved than ever in contacting their representatives about issues and legislation vital to Clemson's interests. The formation of this advocacy group in 1992 was guided by the Legislative Relations Committee of the Board of Visitors, and it will continue to provide leadership and direction for the legislative advocates.

Board of Visitors

The board is one of the key volunteer groups which serves Clemson University through its institutional advancement program. The board of visitors comprises 40 prominent business and community leaders who serve as advisers and advocates for the University during two-year terms. The board conducts regular visits to the campus to receive timely briefings on key issues and institutional priorities. It also provides a two-way communications link between the University and its publics throughout the state.

This important advisory group to the administration was very active during the past year. The board held its general fall meeting in Clemson October 14-16, 1993. New officers elected were: Bill Craven of Waynesboro, Ga, chair; Darra Cothran of Columbia, vice chair; and George Bullwinkel Jr., of Columbia, secretary.

The board's annual spring meeting was April 20-21, 1994. Meetings of the four working committees were held in Columbia in January 1994, and the board's executive committee met in Columbia March 15 to assist in planning the spring meeting.

For the fourth consecutive year, the Board of Visitors Award for Outstanding Graduate Teaching Assistants was presented at the board's meeting in April 1994. Two recipients each received checks for \$600. In December 1993, the solicitation of former and current members resulted in additional contributions of \$3,950 to a fund which was created in 1990 and eventually will be used to endow this award. At the end of June ('94), the account balance was \$10,361.

Legislative Cultivation

Increasing awareness of Clemson University programs and priorities among members of the General Assembly was an important goal of the Governmental Affairs Office last year. Eight senators and 13 members of the House participated in individual and personalized visits and tours on campus. Also there were "in-district" visits with 10 individual Senators and 24 House members to discuss Clemson University legislative initiatives. More than 100 members of the General Assembly attended the fifth annual Clemson catfish and grits dinner in Columbia.

Informational Service

During the past year there were hundreds of requests for information and assistance from legislators and their staff. Governmental Affairs personnel responded to each request promptly.

STUDENT AFFAIRS

The Division of Student Affairs completed another successful year of working with students in expanding our student programs and services. Our goal continues to be providing programs and services that support enrollment, retention, holistic education and graduation. We are committed to maintaining an environment which emphasizes intellectual, emotional, physical, social, cultural and spiritual development as part of the total education experience. In FY '93-94, many programs and activities were conducted to support and improve student life. The following is a brief review of the many accomplishments that occurred during the past year in Student Affairs.

Student Development Office

The Student Development Office kicked off the year with summer orientation for 2,517 students and 3,171 parents. During orientation, students were welcomed and informed of the many offerings at Clemson — both academic and nonacademic programs. Many programs were started, continued and broadened during the year, such as the leadership program, which was expanded to include a leadership class to train students to become leadership consultants. FYI (For Your Information Camp) celebrated its second anniversary and expanded its scope to include parents for the first time. Multicultural and the B.E.S.T. (Black Educational Support Team) programs continued to be offered and broadened. Greek Affairs colonized three new chapters on campus this year and the Greek Leadership Class and Greek Leadership Academy once again were conducted. In looking at the accomplishments of our media organizations, more than 200 students participated in a variety of media activities. *The Tiger* produced 38 issues, and *TAPS* was named a finalist for the ACP PaceMakers Award. Student Disability Services established an Adaptive Computer Lab and a course substitution form was designed and implemented to better serve students with disabilities. The University also provided leadership in establishing SUCCEEDS (S.C. Universities and College's Council of Educators Enabling Disabled Students).

Redfern Health Center

Redfern Health Center treated more than 48,000 patients during FY '93-94. The services provided by the medical, clinical and support staff included primary care, orthopedic services, dermatology clinic, nutritional counseling, after-hours nurses clinic, allergy/immunization clinic, women's clinic and sports medicine. The Health Education Professionals and Peer Educators provided programs, activities and classes in a multitude of subjects dealing with issues such as relationships, sexuality, nutrition, HIV/AIDs and stress management. The services of Redfern were enhanced in FY '93-94 by the implementation of an automated appointment and billing system and the installation of new X-ray equipment. As we move into the FY '94-95 academic year we are continuing to expand our services by the addition of the Clemson University Now Clinic, provision of an after hours Ask-A-Nurse, increase in health education, and the addition of alcohol and drug education and counseling and psychological services.

Counseling and Psychological Services

Counseling and Psychological Services (CAPS) earned a five-year reaccreditation by the International Association of Counseling Services. The CAPS program was restructured within the division to report administratively to the director of Redfern Health Center and will consolidate services this fall in a suite of offices in

Redfern being renovated for this purpose. A new female psychologist with expertise in women's issues was employed, and funds were found within the University to also hire a counselor to work in the area of substance abuse. The group counseling program continued to expand and attention deficit disorder/learning disabilities and gay/lesbian support groups were offered for the first time this year. Additionally, psychological testing now is being provided to assess learning and attention disabilities. Outreach and prevention programs were provided to numerous classes and student groups as well as to area schools, churches and community agencies. CAPS therapists taught nine graduate and three undergraduate courses that enrolled 329 students this year.

University Housing

In University Housing, FY '93-94 was a year both of challenges and progress. Construction difficulties caused a one-year delay in the scheduled fall 1993 opening of two new residence halls, Holmes and McCabe. An intentional reduction in undergraduate enrollment left a surplus in housing space and reduced revenues. Embracing these circumstances as an opportunity to make on-campus living more desirable, the housing administration made several changes. The number of single (private) rooms offered was increased. The graduate housing community in Thornhill Village was expanded. Lounges for study and socializing were designated and will be available in halls where such community space was sadly lacking. And the first-ever "smoke free" living option was marketed. McCabe Hall opened its doors to students for the first time with the first summer session, and response has been exceedingly positive. Long-range planning is under way to build additional apartment-style housing on east campus near Lightsey Bridge, thus allowing Johnstone Hall sections E and F to be closed.

University Union

The University Union underwent several major changes during the FY '93-94 academic year. The Union staff gained the additional responsibility of serving as the general advisors to more than 250 student organizations on campus and as principal administrators of the division's community service programs. The Union also had several significant personnel changes during the year. A new director was appointed, only the second in its 22-year history, and six new staff persons were hired to fill the vacancies created by retirements and resignations. The Union continued to fulfill its mission of providing quality programs and services to enhance the personal growth, social development and leadership training skills of its constituents. During the year the Union sponsored nearly 400 programs that were attended by more than 20,000 people. In addition, the Union served more than 120,000 students in its games area and Edgar's Entertainment Center. Facility improvements continued to be a priority at the Union as the entire exterior of the building under-went a significant facelift. There were many operational improvements made at the Union throughout the year, including an overhaul of our accounting and communication systems that allowed us to better serve our students and operate more efficiently.

Campus Events Office

The Campus Events Office became the newest member of the Division of Student Affairs during FY '93-94. This department is a small, but highly specialized unit. Its role is to provide major events for the students, the University community and the Upstate of South Carolina. During the past year 82,179 people participated in events sponsored by Campus Events. Some of this past year's highlights included the 17th annual "On Stage" cultural arts series, Bob Hope's Parents Weekend Extravaganza, performances by country music star Lorrie Morgan, alternative

band Widespread Panic and, of course, Pink Floyd. One of the more exciting projects sponsored was ClemsonFest, the city's highly successful first festival. It will be an annual event. In addition to major events, this department provided additional services that benefited the Clemson community. It managed Tillman Auditorium, provided technical services for more than 350 programs throughout the University and reserved a variety of indoor and outdoor facilities and equipment. Campus Events also made a huge financial impact on the University's generated revenue total.

Campus Recreation

Campus Recreation enjoyed another banner year in FY '93-94 with student involvement and participation. Facility improvements also were undertaken during the year with the purchase of more than \$100,000 worth of state-of-the-art weight training and exercise equipment. The swimming pool was made accessible for those who are physically challenged and significant improvements also were made to the Cooper Recreation area. Campus Recreation offers a wide variety of intramural programs in which more than 11,000 participants took part, and the 32 club sports involved more than 1,200 participants. The aerobics program averaged 1,600 participants each week. In addition to providing these programs, more than 200 jobs were filled by students during the year. A significant happening this year was the opening of the facilities to the members of the community through the Wellness Program at the College of Nursing.

Career Center

The Career Center was extremely busy in FY '93-94 with several projects broadening its scope of services. There also was some reorganization as the College of Agricultural Sciences Placement Coordinator now reports to the associate director of the Career Center. A new grant was implemented — "Enhancing the Career Development of Successful Job Placement of Disabled Post Secondary Students." A new alumni job listing bulletin, JOBTRAK, was published twice monthly. It should also be noted that job listings from several other southeastern schools were shared between each other to increase the job availability for our students. The staff raised more than \$70,000 to name the board room for Al Mathiasen at the new student center where the Career Center will be located. The department also implemented PHONEMASTER, an automated notification system for students and alumni to access job openings via the telephone. A career guidance system and job listing system on campus called SCOIS also was installed. Several job search workshops were conducted throughout the year. Finally, a minicomputer lab was set up to assist students in word processing, access job listings and update data for campus interviews.

Municipal Court

The Municipal Court continues to provide judicial services for all traffic and criminal offenses (to include parking violations) committed within the jurisdiction of the municipal corporation known as Clemson University. During FY '93-94 the court heard approximately 2,178 traffic cases, 481 criminal cases, approximately 2,123 parking ticket appeals and issued 114 arrest warrants. Parking review boards for student and faculty/staff were established to help cover this tremendous load. The establishment of the boards allowed students, faculty and staff to be heard by a jury of their peers in appeals of parking tickets. The court also monitors the files of approximately 236 persons participating in the Pre-Trial Intervention Program.

Many of our students arrested for alcohol and fake ID charges were able to benefit from this program.

Law Enforcement and Safety Department

The Law Enforcement and Safety Department continued to upgrade and improve by providing specialized training to certified officers and conducting prevention programs during the year. It was a very busy year as officers responded to 7,904 calls and made 449 arrest. The escort policy remained a very popular and valuable service as 3,080 escorts were made. The University police officers also responded to 31 requests for assistance from the city of Clemson. A very effective community policing strategy was implemented. This resulted in much more personal and effective service as officers became more familiar with buildings and personnel. The three detectives were busy with 895 cases during the year. More than 500 crime prevention programs were presented in addition to conducting a Crime Prevention Month Campaign. The Victim Witness Program assisted 652 individuals who had been exposed to criminal acts. The Building Security Coordinator Program was continued and the Student Police Programs were expanded. The department also added new personnel, safety equipment, a computer system and some new replacement vehicles.

University Fire Department and Emergency Medical Service

The University Fire Department and Emergency Medical Service was busier than ever in providing services and upgrading its equipment. Subordinate shift officer positions were created to assist in the absence of regular personnel so that experienced staff always were on hand. A new 1,750 gallon per minute pumper was purchased to meet the required fire flow standard established by the Insurance Services Office. A new firefighter position was filled, and \$50,000 worth of radio communication equipment was purchased through the approval of the Commission on Higher Education. A 10-year extension of the fire services agreement with the city of Clemson also was signed. Personnel were given specialized training to meet federal mandates. Additionally, the department taught several courses throughout the Clemson community on various fire and safety issues.

Parking and Traffic Control Department

The Parking and Traffic Control Department stayed busy improving the shuttle service, registration of vehicles and building new parking lots. The shuttle service transported 519,733 customers in FY '93-94 and emphasis was placed on efficiency and service by changing the schedule of routes and adding bus stop signs with schedules and routes posted at all pick-up locations. Enforcement of fines for multiple violators was improved by the use of hand-held computers by parking enforcement officers. A new software system was installed to improve record keeping and tracking ability. A new 90-day permit was created in response to customer demand for short-term parking. Several improvements in customer service were made to make it more convenient to register vehicles. A maintenance survey on parking facilities was completed to assist the department in maintaining the lots. Lastly, work was begun on two new parking lots which should give the campus approximately 700 new parking spaces.

UNIVERSITY RESEARCH

Clemson University continues to be ranked by the National Science Foundation among the nation's top 100 educational institutions in total research and development expenditures.

During FY '93-94, externally funded University programs received in excess of \$36 million in grant or contract awards, \$3 million in research-related gifts, equipment/software donations, and \$5.9 million in research facilities financing. Additionally, the Clemson University Research Foundation (CURF) received or acted as the fiscal agent for \$11.4 million toward major research program initiatives: National Textile Research Center (U.S. Dept. of Commerce), Advanced Gas Turbine Research Program (U.S. Dept. of Energy), and the Watershed Conservation in La Amistad Biosphere Reserve (McDonald's Corp.), (\$7.1, \$3.9 and \$.4 million respectively). Total sponsored programs and unrestricted research expenditures exceeded \$111 million in FY '93-94.

The University's collaborative research activities included relationships with government, industry, and other research universities. The University's research initiatives extend across the boundaries of academic colleges, institutes and centers to provide an effective, broad-based foundation for various collaborative arrangements.

The scholarship of faculty and administration supported by such sponsored programs significantly contributes to the University's academic and classroom environment, and to maintaining an atmosphere in which basic problems are addressed and new ground is broken.

The Office for Sponsored Programs processed more than 1,600 proposals, 1,200 awards and developed more than 40 research subcontract agreements in support of the University's externally funded programs.

Department of Research Services

The Department of Research Services is responsible for coordinating institutional compliance with federal laws regulating the use of animals in research, teaching and testing activities and research activities involving the use of human subjects. The department manages the operations of all biomedical research facilities supporting animal research and teaching on campus. In addition, the department provides technical and professional support, as well as education and training for University personnel who use animals in research, teaching or testing activities.

Significant accomplishments and activities during FY '93-94 include:

- Clemson University animal research facilities and program received full accreditation from the American Association for Accreditation of Laboratory Animal Care (AAALAC) on July 8, 1994. AAALAC is a voluntary accreditation process that represents the gold standard in animal care. Clemson is only the fourth land-grant institution in the country to receive full accreditation for both agricultural and biomedical animal care and use programs. AAALAC accreditation provides assurance to funding agencies and to the public that research and teaching animals used at the University receive a uniform level of high quality care.
- Renovations of animal care facilities at the Poole Agricultural Center and Jordan Hall were completed. These improvements were accomplished using funds awarded through a National Institutes of Health grant and were

instrumental in allowing Clemson to meet high standards necessary for AAALAC accreditation. The new Starkey Sheep and Goat Center was completed in spring 1994. This 2,000 square-foot facility provides heated and ventilated sheltered housing for sheep and goats used in biomedical research and teaching programs.

- An NIH grant for the improvement of animal research facilities in the amount of \$166,234 was awarded on May 1, 1994. These funds will be used to renovate the Starkey Surgical Facility and to purchase equipment to be used to support surgical research and teaching programs at Clemson.
- Construction of the new biomedical research facility began in spring of 1994. This facility will provide 25,000 square-feet of state-of-the-art animal research facilities including animal housing, surgery and postoperative care rooms, biocontainment areas, environmentally controlled rooms and research laboratories.
- The Clemson Animal Care and Use Seminar was conducted for all faculty, staff and students involved in animal research and teaching in August 1993, and again in January 1994. The seminar provides information and training necessary to comply with federal regulations.
- A training workshop for faculty, staff and students involved in the use of Human Subjects in Research was conducted on April 4, 1994. This workshop was videotaped and tapes are available along with written training materials through the Department of Research Services.

Emerging Technology Center

The Emerging Technology Development and Marketing Center (ETC) was established in 1987 supported, in part, by a grant from SCANA Inc. The ETC was established to be a catalyst to stimulate economic development in South Carolina by providing technical and marketing services that assist small-scale/start-up companies to become more competitive. The center assists approximately 100 inventors, entrepreneurs and new start-up companies annually.

Accomplishments for FY '93-94 include:

- The ETC cosponsored, with Enterprise Development Inc. of South Carolina (EDI), the sixth annual Dare-to-Deal, the state's only venture capital conference. The conference has successfully linked early-stage and start-up companies with financial institutions and individual investors seeking to partner with such enterprises.
- The ETC represents Clemson University on the Technology Transfer Council of the S.C. Universities Research and Education Foundation (SCUREF). As such, the ETC serves as an interface between SCUREF, the Westinghouse Savannah River Co. and faculty, staff and students at Clemson.
- The ETC made presentations concerning technology transfer and economic development at several meetings and conferences including the Association of University Technology Managers and the Alliance of Universities for Democracy.
- The ETC provided continued technical and business leadership to the Clemson Center for Applied Technology (CAT). The CAT facility, owned by the Clemson University Research Foundation, is managed by EDI. The facility is unique in South Carolina in that it "incubates" technology-based start-up companies, with an emphasis on technology developed at the University. CAT currently houses 10 start-up companies. The ETC director

serves on the CAT Advisory Board as does Clemson University's vice president for research.

- Since its inception, the ETC has been directly and indirectly responsible for locating more than \$10 million in support for small, expanding-growth companies in South Carolina and for inventors to commercialize their innovative products and processes.

Intellectual Property Committee

The Intellectual Property Committee reviewed 38 patent and computer software disclosures during the year. The committee approved 10 for processing by the University's private patent attorney and 20 for processing through Research Corporation Technologies (RCT). Another eight were selected for marketing, under a confidential nondisclosure agreement, with the intent of patenting each technology only after a commitment is obtained from a company to license the technology. Of the technologies submitted to RCT, one was considered of sufficient interest to commit \$1,000 for a first-level option for a more thorough review.

Estimated income from patents and software copyrights, including that received by the Clemson University Research Foundation, was approximately \$4.3 million. Four license agreements were completed during the year and, at the close of the fiscal year, eight other license agreements were being negotiated. Twelve U.S. and foreign patents were issued in the name of Clemson University.

Total Number of Documents Printed	255
Cost Per Unit	\$ 6.63
Printing Cost - S.C. State Budget & Control Board (up to 255 copies)	\$ 1691.93
Printing Cost - Individual Agency (requesting over 255 copies and/or halftones)	\$ —
Total Printing Cost	\$ 1691.93